

# Personal Computer

Portable Unix  
power  
by HP

US \$2.50/FF 18.50/SFr 7.30/IR £1.41/BFr 99.00/  
Lire 5,700/DKr 27.00/DM 9.5

World

June 1985 95p

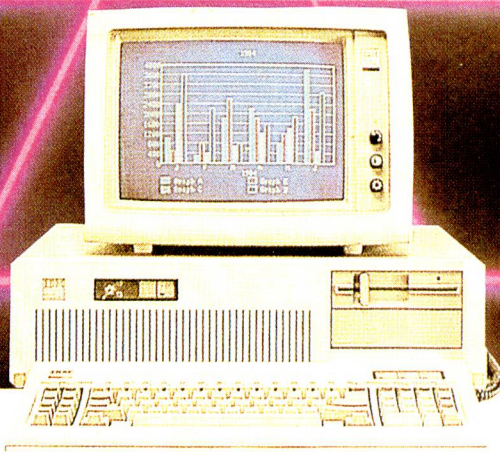
BRITAIN'S BIGGEST MONTHLY COMPUTER MAGAZINE



**UNCLE JACK WANTS YOU!**  
**Exclusive: Tramiel's Atari 520ST tested**



# Silicon Valley



## Export, Buy, Rent or Lease.

Join hundreds of leading companies – come to Silicon Valley in the heart of London for the very best hardware, software, training and above all – SERVICE.

The B.B.C., British Telecom, Coopers and Lybrand, Express Newspapers, Imperial College, London Business School, The First National Bank of Chicago, McDougall, The National Computing Centre, Rank Xerox, Thames Water Authority, The Institute of Chartered Accountants...

These are just some of the many hundreds of companies and organisations who have dealt with us over the years.

Why do they come to Silicon Valley? Because whether you're a first time user or an established computer professional we try harder to provide friendly, helpful advice; a fuller service and better deals.

Whether you want the latest sophisticated multi-user system, accounts software or simple add-ons we can supply you quickly from our large depth of stock.

Shown above are just three of the many computers we can offer. From

left to right they are: the Macintosh from Apple, the New AT from IBM and the Apricot from ACT.

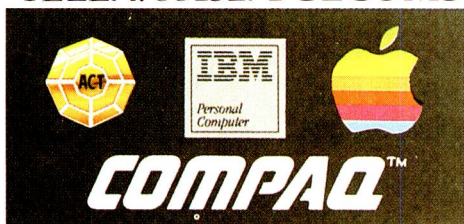
What about our service?

We have our own workshops, stores and maintenance facilities at our premises, which enable us to provide a comprehensive after-sales service.

We also offer a full range of training programmes for you and your staff.

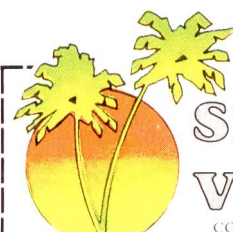
**TEL: 01-833-3391**

**TELEX: 8813271 GECOMS**



**NEW OFFICE**

2, Paul St, E.C.2. Tel: 01-247 8577



**silicon valley**  
COMPUTER CENTRE

**164 Grays Inn Road,  
London WC1**

I am interested in the following.  
Please send me further information.

- HARDWARE ☐
- SOFTWARE ☐
- WORD PROCESSING ☐
- NETWORKING ☐
- COMMUNICATIONS ☐
- TRAINING ☐
- COMPUTER SYSTEMS ☐
- GENERAL ADVICE ON ☐
- MICROS ☐
- SUPPLIES ☐

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address: \_\_\_\_\_

Tel No: \_\_\_\_\_



# Everyone can benefit from Effective Micro Training at Digitus

## NEXT COURSE DATES

### Introduction to Personal Computers

Provides a basic understanding of microcomputer hardware, software and peripherals. Establishes the criteria for selecting and using micros. Explains the rudiments of programming. **1 day. £105.**

Jun 10

### Introduction to DOS

Provides a concentrated introduction to PC/MS DOS. Also reviews hardware components and popular applications. **1 day. £105.**

Jun 24

### Lotus 1-2-3

A workshop course with advice on the design of worksheets and on solving practical problems. **1 day. £105.**

Jun 25

### 1-2-3 to Symphony

A practical conversion workshop for existing 1-2-3 users. **1 day. £105.**

Jun 3

### Introduction to Symphony

Provides a concentrated introduction to the main elements including spreadsheeting, graphics, information management and "managers" wordprocessor. Teaches the basic skills needed to use these features. **2 days. £210.**

Jun 4

### Symphony Workshop

Consolidates basic skills and teaches advanced features including building systems with the integrated package and command language. **2 days. £210.**

Jun 6

### Working with dBASE II

Teaches the user how to build and enquire from files and generate reports. **1 day. £105.**

Jun 17

All course fees are subject to VAT

### Programming with dBASE II

Teaches programming using the dBASE procedure language and also file design and indexing. **2 days. £210.**

Jun 18

### dBASE II Workshop

Builds on existing dBASE skills to teach the more advanced use of the procedure language and the practical application of all these facilities. **2 days. £210.**

Jun 20

### Wordprocessing with WordStar

A practical workshop course which teaches basic skills. **1 day. £105.**

Jun 19

### WordStar Workshop

A workshop to consolidate basic skills and teach advanced commands. **1 day. £105.**

Jun 20

### MailMerge

Efficient use of WordStar for mailing using MailMerge. **1 day. £105.**

Jun 21

### Wordprocessing with Multimate

A practical workshop course which teaches basic skills. **1 day. £105.**

Jun 18

### Multimate Workshop

Covering advanced features of Multimate, providing an ideal follow-up. **1 day. £105.**

Jun 19

### Wordprocessing with DisplayWrite 2

A practical workshop teaching basic skills on this increasingly popular IBM-oriented wordprocessing package. **1 day. £105.**

Jun 5

### SunAccount

A practical course for both experienced and new SunAccount users. **2 days. £210**

Jun 3

### Fundamentals of BASIC

Develops the first principles of BASIC programming so that you can produce programs on a microcomputer. Gives practical hands-on experience of micros. **2 days. £210.**

Jun 11

### Improve your BASIC

Brushes up and improves BASIC programming technique; introduces sophisticated methods of file design, data organisation, access methods and control. Examines software tools. **2 days. £210.**

Jun 13

### Communications

Introduces the techniques of communicating between micros, from micros to peripherals and from micros to mainframes. **1 day. £125.**

Jun 6

### UNIX

An introduction to the facilities of the UNIX multi-user operating system, including the file system, shells and editors, and a review of the problems of system management. **3 days. £375.**

Jun 10

### UNIX Workshop

Further skills for those with responsibility for a UNIX system. **2 days. £250.**

Jun 13

### The C Programming Language

A tutorial on the main features of the C language, with extensive practical sessions on a multi-user system. **2 days. £250.**

Jun 24

### "C" Workshop

More advanced C programming skills. **2 days. £250.**

Jun 27

The following courses are also held on a regular basis.  
Please send for details of next available dates.

### Advanced Lotus 1-2-3

Builds on existing Lotus 1-2-3 skills, presenting information on database, statistical and file functions. **1 day. £105.**

### Spreadsheeting with SuperCalc

A workshop course with advice on the design of worksheets and on solving practical problems. **1 day. £105.**

### Information Management with Cardbox

A workshop course on design, applications and implementation. **1 day. £105.**

### Introduction to Framework

Teaches the basic skills to operate the spreadsheet, graphics, database and wordprocessing. **2 days. £210.**

### Data Management with Delta

Teaches how to design, define and implement systems using this powerful data management package. **1 day. £105.**

### Spreadsheeting with Multiplan

A practical workshop course on this popular spreadsheet package. **1 day. £105.**

## MANAGING OFFICE AUTOMATION

A two-day seminar to prepare management to devise and implement a successful office automation strategy. It addresses key issues, presents current examples and provides the opportunity to discuss important aspects related to the needs of your organisation.  
Next seminar: June 3-4.



Send to, or phone:

The Training Administrator, Digitus Ltd.  
Lading House, 10-14 Bedford Street,  
Covent Garden, London WC2E 9HE  
Tel: 01-379 6968 Telex 27950 ref 3005

From .....  
Company .....  
Address .....  
Please book places as follows ☐ or send me more details ☐  
Course ..... Date ..... Places .....

PCW/685

## IN-COMPANY TRAINING

Digitus provides courses tailored to the needs of individual companies, from seminars for management to detailed training for office and professional staff. Courses can be held on company premises, or at the Digitus Training Centre. Contact the Training Administrator for full details.



# CONTENTS



Cover story begins page 136  
Photograph by Crispin Thomas

Vol 8 No 6 June 1985 95p

## REGULARS

### NEWSPRINT

110

The best, brightest and most objective news — presented by Guy Kewney.

### YANKEE DOODLES

126

The dreams and schemes of the American industry explored by David Ahl.

### SUBSCRIPTIONS

128

Irresistible advertisements for an irresistible magazine (*PCW*, of course).

### LETTERS

131

Readers' views aired — assuming the mice haven't been nibbling away at these pages too.



### BANKS' STATEMENT

134

Friend of the famous Martin Banks pictures the scene in the Sinclair research laboratory.

### BIBLIOFILE

210

Biological computers and silicon spys — there's never a dull moment when you're a book reviewer.

### TJ'S WORKSHOP

212

More hints and tips to help you make the most of your micro including programs for Memotech, Spectrum and BBC micros.

### SUBSET

214

Fully documented machine code routines for speedy processing.

### SCREENPLAY

216

Unravel the mysteries of Exodus, play a game of baseball, turn into a witch or spend a day at the seaside with the micro equivalent of *Spitting Image* — just a taste of this month's best games.

### COMPUTER ANSWERS

220

Simon Goodwin presents the solutions to your problems.

### NETWORKS

222

The world of communications explored by Peter Tootill. This month he takes a look at Prestel, including a list of useful Prestel commands.

### END ZONE

226

Touchdown for Transaction File, Diary Data, Leisure Lines, Numbers Count, Computer Chess and ACC News.

### PROGRAM FILE

232

The pick of the programs — artificial intelligence for BBC owners plus utilities and games for other micros, and a challenge to circuit designers.

### ADVERTISERS' INDEX

310

Who's where in this issue.

### CHIPCHAT

312

Acned, bearded and occasionally bespectacled — could this be an accurate description of a *PCW* regular? See what you think, as we give you a chance to poke fun at us — as well as at the wonders of the micro industry.

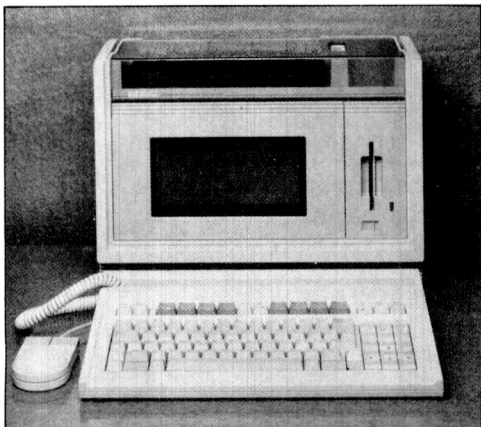
Founder Angelo Zgorelec Editor Graham Cunningham Production Editor Ginny Conran Acting Production Editor Kirstie Rogers Sub Editor Lauraine Danker Business Computing Editor Peter Bright Staff Writers Nick Walker, Stephen Applebaum Consultant Editors David Tebbutt, Dick Pountain Editorial Secretary Tracy Dear Art Director Peter Green Assistant Art Editor Paul Ballard Typesetters Meadway Graphics 198 Victoria Road Romford Essex Sales Director John Cade Publisher Tony Harris Publishing Manager David Mankin Group Advertisement Manager Duncan Brown Advertisement Manager Bettina Williams Assistant Advertisement Managers Claire Rowbottom, Phil Pratt Sales Executives Claire Barnes, Steve Corrick, Jeska Harrington, Tony Keefe, Christian McCarthy, David Morgan, Isabel Middleton Advertisement Assistant Nicola Hall Advertisement Production Gerry O'Sullivan Production Assistant Howard Carter



# BENCHTESTS & REVIEWS

## COVER STORY: ATARI 520ST 136

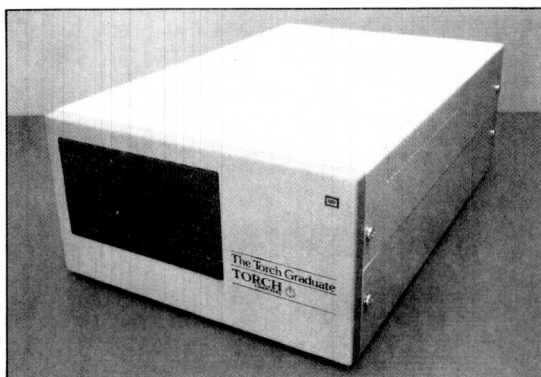
From the man who brought you the Commodore 64 comes the Atari 520ST. Peter Bright is first to find out if the machine matches its high specifications.



## HEWLETT PACKARD INTEGRAL PC 144

The Unix operating system, a 68000 processor, built-in printer and an electroluminescent display that you can actually read, all packed into one transportable box. Hewlett Packard reaches the parts other manufacturers are still researching — but at a cost. Nick Walker balances price against performance.

**TELESKETCH 158**  
A cross between a communications terminal and a stand-alone micro, with a telephone handset and lightpen thrown in for good measure. Stephen Applebaum picks up the receiver.



## GRADUATE 162

An add-on unit providing BBC users with IBM PC power and bundled software — but is the upgrade too late? Jon Vogler checks it out.

## BCPL 164

Two implementations of this highly portable programming language compared — one for the QL and one for the BBC.

## MICROSOFT WORD 194

First Mac question: is the Macintosh a real business machine? Kathy Lang finds out by assessing its merits as a word processor in this evaluation of Word.

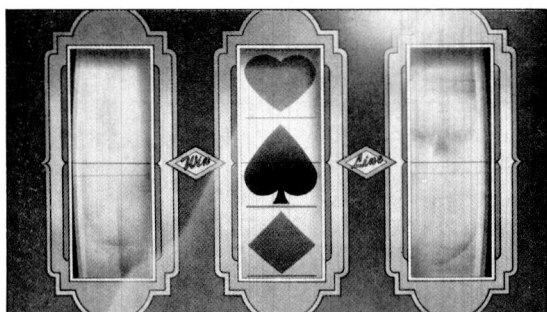
## MICROSOFT FILE 198

Second Mac question: how much easier does it make business? This review of File, Microsoft's Macintosh database package, provides the answer.

## PC AUTOMATOR 204

Customise your own applications with this new package.

# FEATURES



## BEATING THE SYSTEM 152

The intricacies of random number generation explained — plus some suggestions for winning at Blackjack.

## GETTING TOGETHER 170

Interfacing two micros can be difficult and expensive, but not if you read this article and want to link a BBC to an Apple II.

## SPELLBOUND 176

An introduction to the delights of macro-programming — tailoring applications packages to meet your own requirements — using Spellbinder as an example.

## RETURN TO SENDER 182

Electronic mail techniques explained, plus advice on sending and receiving your own mail.

## FINDING THE WAY 188

For travelling salesmen, Konigsberg Bridge crossers and lovers of algorithms — the intricacies of problem solving explored.

## PROCEED WITH LOGO 206

With new implementations of Logo arriving all the time, the full capabilities of this language deserve reassessment. Harvey Mellor begins this six-part Teach Yourself series.



# Computer Enterprises

**APRICOT/IBM** . . . CALL US LAST WITH YOUR BEST QUOTES (PC, Xi, F1, Portable, Point 7, Point 32)/(PC, XT, AT)

**OLIVETTI**  
OLIVETTI M24/21 Portable . . . Ring for the BEST PRICES

**SIRIUS/VICTOR**  
VICTOR 1 2Mb + 256k 4Mb + 256k RAM £1695 £2250  
VICTOR 10Mb HARD DISK + 1.2Mb DRIVE + 256k RAM £2790  
VICKY (Portable) 2 4Mb drives + 256k RAM . . . £1950  
VICTOR VI (Runs IBM Software) . . . £3990  
PC Card (Makes Sirius IBM-Compatible) . . . £950

**SANYO**  
SANYO 775 Colour with free software . . . "NEW" £1795  
SANYO MBC 2x720k DRIVES + monitor + Free Software . . . £990  
SANYO MBC 10Mb HARD DISK + Monitor + Free Software . . . £1990  
SANYO 555 With £1000 worth software . . . £790  
SANYO 550-2/555-2 £1000 worth software . . . £799 £1159

**COLOMBIA**  
COLOMBIA Twin Disks, mono, bundled software/Colour . . . £1799 £1895  
COLOMBIA 10Mb + 320k disk + £1000 software/Colour . . . £2850 £2940  
COLOMBIA VP PORTABLE 128k RAM/256k RAM + Software . . . £1299 £1350

**MACINTOSH** Macwrite + Macpaint/Apple IIe/IIc . . . £1499 £495 £799

**COMPAQ**  
COMPAQ 256k RAM, 2 DRIVES + MS-DOS . . . £1850  
COMPAQ 256k RAM, 10Mb HARD DISK + DRIVE . . . £3150  
DESKPRO MOD2/DESKPRO MOD4 . . . £2100 £4490

**TELEVIDEO**  
TELEVIDEO TELE-PC 1605 . . . £1695  
TELEVIDEO TPC-10 PORTABLE . . . £1750

## PRINTERS

### DOT MATRIX

Smith Corona F180/D100/D200/D300  
New LOW PRICES . . . RING  
Canon PW1080A/1156A (NLQ) . . . £285 £375  
Canon PJ1080A (Ink Jet) . . . £389  
Kaga Taxan KP810/910 (NLQ) . . . £289 £399  
Panasonic NLQ 80/136 . . . £275 £375  
Riteman III NLQ . . . £299  
MP165 NLQ 165cps . . . £279  
Citizen 160cps/40cps NLQ . . . £399  
Honeywell 32/38 . . . £499 £1110  
Dataproducts 8050/8070 . . . CALL  
Dataproducts 8010/8020 . . . CALL  
Brother EP44 KSR HR5 . . . £195 £129  
Brother M1009/TC600 . . . £189 £395  
Brother 2024 NLQ . . . £850  
Panasonic KX-1091 120cps/LQ . . . £265 £399

Epson P40/P80 . . . £95 £150  
Epson JX80 Colour . . . £499  
Epson RX80FT . . . £239  
Epson FX80 . . . £359  
Epson RX100FT/FX100FT . . . £359 £459  
Epson LQ1500 . . . £895  
Fujitsu P1340/1351 (24 pin) . . . CALL  
Shinwa CPA80/CPB80 . . . £179 £199  
Shinwa CPB 136P . . . £350  
NEC P2/P3 . . . £650 £795  
Brother 2024L (190cps) . . . £899  
Brother 1009 . . . £179  
Prism 132S (Colour) . . . £999  
Microprint FT (S&P) . . . £299  
Mannesmann Tally M180 . . . £180  
Mannesmann Tally M1160 . . . £350  
Mannesmann Tally M1180 . . . £530  
Seikosha GP700A (Colour) . . . £349  
Seikosha GP250X . . . £199  
Seikosha GP550A . . . £219  
Seikosha GP100A . . . £149  
Seikosha BPS420 420cps . . . £390  
Microline 82A 92P . . . £239 £360  
Microline 83P/93P . . . £468 £599  
Microline 84P . . . £659  
Microline 2410P . . . £1590  
Star Gemini 10X/15X . . . £219 £299  
Star Delta 10X/15X . . . £359 £429  
Star Radix 10X/15X . . . £470 £595  
Toshiba 2100H (LQ) . . . £1349  
Texas Instruments 810/LQ . . . £995  
Texas Instruments 855/LQ . . . £695  
Anadex DP9725 (240cps) . . . £1195  
Anadex WP6000 (330cps) . . . £1795  
Anadex DP6500 (500cps) . . . £1990  
ORE-Newbury DRI 8925 240cps £1445  
Newbury Data 8931 240cps + LQ . . . £1750  
Newbury Data 8950 480cps . . . £1990  
Hermes 512B . . . £1690  
Anadex DP9500 (180cps) . . . £850  
Anadex DP9620 (240cps) . . . £985  
Phillips Mullard GP300 . . . from £1900  
Siemens P188 & P189 (Ink Jet) . . . £399  
Diablo 620 R/O . . . £890  
Canon Laser Printer . . . £2900  
HP Laser Printer . . . £3195

**DAISYWHEEL PRINTERS**  
Brother HR1 HR15 . . . £280 £349  
Brother HR25/35 . . . £595 £799  
Juki 6100/6300 . . . £299 £750  
Juki 2200 . . . £249  
Queen-Data . . . £219  
Daisytype 2000 . . . £269  
Queen Letter-Pro 20 . . . £446  
Queen 9/45-55 . . . £1595 £2150  
Queen 11/40-55 . . . £1195 £1379  
NEC 3510 (S or P) . . . £1015  
NEC 2010 (S or P) . . . £539  
NEC 2050 (for IBM) . . . £699  
Diablo 620 R/O . . . £890  
Diablo 630 API . . . £1299  
Ricoh 1200/1300 . . . £495 £795

## ZENITH

Desk Top Twin 320/360KB Drives IBM Comp/Portable . . . £1795 £1699  
Desk Top 10Mb Hard Disk & Drive . . . £2790

## COMMODORE

COMMODORE PC 256k RAM, 12" MONO, DOUBLE DRIVES . . . £1350  
COMMODORE 8296, £1000 worth free software . . . £1499

## EPSON

EPSON QX10 192k RAM, Dual DD, Free Software . . . £1495  
EPSON PX-8 64k, CP/M, Basic, Wordstar/120k RAM PACK . . . £699 £859

## KAYPRO

KAYPRO 2 Twin single sided & free Soft . . . £850  
KAYPRO 4 Twin double sided & free Soft . . . £1175  
KAYPRO 10 with 10Mb HD and Free software . . . £1900  
KAYPRO 286 (IBM AT Compatible) . . . £2450

## NEC

NEC APC Mono, Dual drive, 128k, 2Mb disks/Colour . . . £1890 £2190  
NEC PORTABLE PC8201 + £200 Free software . . . £279  
NEC SPECIAL BUNDLE . . . £279

Ring to find out this AMAZING DEAL  
CANON A200M/A200C, 256k RAM, Twin Drives . . . £1390 £1450

HEWLETT PACKARD HP 150 . . . £2195  
HYPERION 256k, Ram disk, 2 drives, Free software/1995  
WREN with built-in modem . . . £995  
EINSTEIN Colour, Twin DD . . . £499  
SINCLAIR QL DISK INTERFACE . . . £320 £149  
BBC B With DFS £399, COMMODORE 64 £179, ELECTRON £199

## MULTI-USER COMPUTERS

NORTHSTAR DIMENSION 15Mb HD, 2 User/each user . . . £4995 £1295  
ALTOS Xenix, MPM86, 1 to 8 Users, Ethernet . . . POA  
TELEVIDEO 8 or 16 bit, 80Mb, 2 to 32 users . . . POA  
OLIVETTI 386 Unix V and UNIX SOFTWARE . . . RING

## PRINTERS

### DOT MATRIX

Ricoh 1600 . . . £1375  
TEC F10-40/50 . . . £995 £1250  
Smith Corona T1P1/L100 . . . £189 £249  
Silver Reed EXP "NEW" . . . CALL  
Brother EM101 KSR . . . £799  
HP 2225 Thinnet . . . £399

## AUTO SHEET FEEDERS

Genesis (Juki/TEC/NEC/Ricoh/Diablo) . . . £299  
Rutishauser Mechanical . . . £395  
Rutishauser Electro Mechanical . . . £479  
Tractor Feeds . . . £159  
Acoustic Hoods/with SSF . . . £250 £375  
Printer Stand for any printer . . . £79

## MONITORS

### MONOCHROME

Roland MB121 Green/Amber . . . £120  
Sanyo DM8112 CX (18mhz) . . . £89  
Sanyo DM9112 12" (20mhz) . . . £110  
Philips 7502/7512 . . . £79 £85  
Kaga 12G (Green) . . . £99 £110  
Zenith Green Amber . . . £90  
BMC 12" High Res . . . £99  
Zenith 12" Green/Amber . . . £95  
Yanjen (Green/Amber/tilt/Sw) . . . £99  
Swivel & Tilt Monitor Stand . . . £28

## COLOUR

Roland CC-141 14" (640 x 200) . . . £395  
Kaga K12R1X RGB/PAL . . . £199  
Kaga K12R1X RGB/PAL . . . £249  
Sinclair Visio QL . . . £235  
Novex 14" RGB . . . £239  
Luxor 14" (Super Res, 800 dot) . . . £495  
Dyneer 14CM 640 x 200 . . . £399  
Dyneer 14CM 720 x 350 . . . £575  
Sanyo CD3117M (620 dot) . . . £295  
Sanyo CD3115H (720 dot) . . . £399  
Fidelity CM14 12mhz, RGB & COMP . . . £185

Microvix monitors . . . POA  
Princeton RGB Hi-Res . . . £427

## TERMINALS

Qume QVT 102 . . . £455  
Qume QVT 108 . . . £590  
Qume QVT 211GX (Tektronics) . . . £856  
Qume QVT 103 (DEC VT100) . . . £595  
Kokai ICL 11 . . . £350  
Televideo 924/925-950 . . . Best Price  
Zenitec (Various Emulations) . . . £495  
Hazeltime Esprit I/II . . . £450 £495  
Hazeltime Esprit III (TVI 950) . . . £655  
Tatung VT4200 . . . £499  
Wyse WY50/WY75 . . . £595 £699

## PLOTTERS & DIGITISERS

Roland DXV800 (8 Pen/A3) . . . £495  
Roland DXV800 (HP Compatible) . . . £690  
Roland DXV980 . . . £775  
HP 7470/7475 . . . £895 £1390  
Watanabe MP1000 . . . £699  
Watanabe WX4636 . . . £2165  
MT Plotter (with SF) . . . £495  
ACT Writer 80/81 . . . £528 £695  
Epson H180 Expansion RAM £365 £75  
Gould Bryans DP7 . . . £1255  
Houston DMP42 (A2) . . . £2990  
Houston DMP52 (A1) . . . £3990  
Strobe 8 Pen drum plotter . . . £655  
Summagraphics . . . £595  
Houston Hi-Pad . . . £699  
Sweet-P . . . £800  
PC-Pad Digitizer . . . £390  
Calcomp Digitizer . . . POA

## SOFTWARE

(New LOWER PRICES on all software)  
WordStar 2000 (IBM Apricot) . . . £295  
Dataflex (Single Multi User) . . . £595 £990  
Lotus 123/Symphony . . . £299 £399  
Open Access (Sirius Apricot) . . . £350  
Framework Friday . . . £350 £175  
dBase II/III . . . £250 £325

Sensible Solution . . . £600  
Exchange (4 Int Package) . . . £395  
Card-Box/Plus . . . £139 £295  
Files & Folders/Office . . . £250 £450  
Volkswriter Deluxe . . . £190  
PFS: Report/Write/Graph . . . £350  
File Transfer IBM Apricot/Sirius . . . £95  
Autocad ADE1/ADE2 £800 £300 £300  
Doodle (CAD Package for IBM/Apricot) . . . £695  
Cadplan (CAD with Autodimensioning) . . . £1500

Smartwork (Circuit-Board-Design) £895  
QED + Main Street Filer . . . £290 £150  
Sage Accounts/Plus . . . £295 £590  
Easy Junior . . . £395  
Sycero Crossstalk . . . £499 £129  
Pulsar Pegasus . . . £250 £275  
Microsoft Project . . . £375  
Pertmaster Milestone . . . £650 £295  
Harward Project Manager/Horner . . . £379 £2150  
Omni III/Datamaster . . . £399 £425  
Everyman Knowledgebase . . . £379 £395  
Concurrent CP M66 with windows £175  
Wordstar Professional . . . £250  
Multi Tool Word w/Mouse . . . £275  
Multimate Wordperfect . . . £250 £399  
Wordcraft Samma + . . . £299 £500  
Arabic Word Processor/Conversion . . . £550 £500

Perfect II (Writer Calc/Filer) . . . £395  
Filevision (Mac) MacCash/MacLedger . . . £140 £295  
Jazz/Desq . . . £395 £290  
Emergraph Helix . . . £290 £290  
Crosstalk/Sidekick . . . £129 £49  
Human Edge Software . . . Each £195  
Expert Ease/Mini Proper . . . £650 £29  
Superwriter VI. 10 . . . £150  
Supercalc 2/3 . . . £195 £235  
Multiplan/Trigger . . . £150 £450  
Delta 4/Retrieve II . . . £350 £350  
Smart WP/DB/SS . . . Each £295  
Micromodeller . . . £595  
Copy II Plus (IBM Apple) . . . £39  
Think Tank/TK Solver . . . £125 £190  
Jane (Apple) Spotlight . . . £179 £195  
Sargon II/III . . . £22 £29  
Millionaire (Stock Market simulation) . . . £39

Prokey (IBM Frogger/Pinnball) . . . £95 £25 £29  
Spotlight . . . £99  
Management Training Series . . . £350  
Backgammon/Checkers/Chess . . . £49  
Flight Simulator . . . £39  
Turbo Pascal (With 8087 Support) . . . £49 £85  
News Agents System . . . £500  
Integrated Travel Agents System . . . £750

**COMMUNICATION**  
Acoustic Couplers (CX21 KN) . . . £160 £130  
Buzzbox Modem V21 Auto Answer . . . £90 £139  
Portman V2123/V2123AA . . . £125 £170  
Telemod V21AA/V2123AA . . . £130 £150  
Minor Miracles V21 V22 . . . £120  
Steebak SB1212/V22 (With autodial) . . . £450 £650  
Microm Borer M4012/V22(AA) . . . £600  
Microm Borer M3012/V21V23(AA) £250  
Master Systems V2123/2123AD . . . £230  
Dacom V2123AD/2123GT . . . £330 £450  
Braid Telex System . . . £1750  
Telexbox II Mytelex . . . £1350 £1700  
Communique (Sirius Apricot) . . . £350  
Telecom Gold Easylink One to One . . . POA  
Sage Communication Pack . . . £350  
IBM Internal Modem V2123AD . . . £290  
Pace Multifunction . . . £137

**PAM**  
COMPUTERS

apricot

**SANYO**

## FOR YOUR FIRST COMPUTER SYSTEM

When you buy a system from PAM COMPUTERS that is not all you get, with each system comes advice, training and ongoing support. We will advise you on the right system for your business having first assessed what your needs are.

## COMPLETE BUSINESS SYSTEMS

SANYO MBC555 with 2x160k disks . . . £1369  
SANYO MBC555-2 with 2x360k disks . . . £1699  
APRICOT PC with 2x720k disks . . . £2299  
APRICOT Xi 10 with 10MB & 720k disks . . . £2999

## FREE TRAINING

Prices include a matrix printer, everything you need to set up your first system, plus free software and 2 days on-site training. These systems include the SAGE integrated accounts package. All prices exclude vat.

## ASK ABOUT OUR SOFTWARE PRICES NORMALLY 30% OFF RRP

Please PHONE  
for more details about our systems

3 TENNYSON ROAD, ASHFORD, MIDDX TW15 2LN

**(07842) 48972**

## X T CONVERSION KITS FOR IBM® AND COMPATIBLES

### NEW FAST CONTROLLER!

WESTERN DIGITAL 1002 SWX-2  
ST-506 STANDARD . . . £249

MR 521 HALF HEIGHT, 5 1/4"  
10MB WINCHESTER DRIVE (FORMATTED)  
2-HEADS, AVERAGE 85cms ACCESS . . . £399

MR 522 HALF HEIGHT 5 1/4" 20 MB  
WINCHESTER DRIVE (FORMATTED)  
4 HEADS, AVERAGE 85ms ACCESS . . . £579

SET OF CABLES FOR ABOVE . . . £25

### RAM CHIP SALE!!!

4164 64K DRAM 150Ns . . . £2.35 each  
41256 256K RAM 150Ns . . . £5.99 each  
(for upgrade Olivetti-M24, Compaq Deskpro etc)

Prices exclude VAT and delivery. For terms see our other advertisements.

**DIGITASH**  
BUSINESS SYSTEMS LTD  
88, MAPLE DRIVE, EAST GRINSTEAD, WEST SUSSEX, RH16 3JR

TEL: (0342) 24631 • 313427  
TLX: 957547



## COMPUTER ENTERPRISES INTERNATIONAL LTD

Tel: 01-543 6866 542 4850. Telex: 946240 CWEASY G (Quote: 19005565)

EASYLINK MAILBOX NO: 19005565

SHOWROOM (OPEN Mon-Sat 9 to 5):

85-85A QUICKS ROAD, WIMBLEDON, LONDON SW19 1EX  
LESSINGSTRASSE 60, 5300 BONN 1 W. GERMANY. Tel: 0228 214125

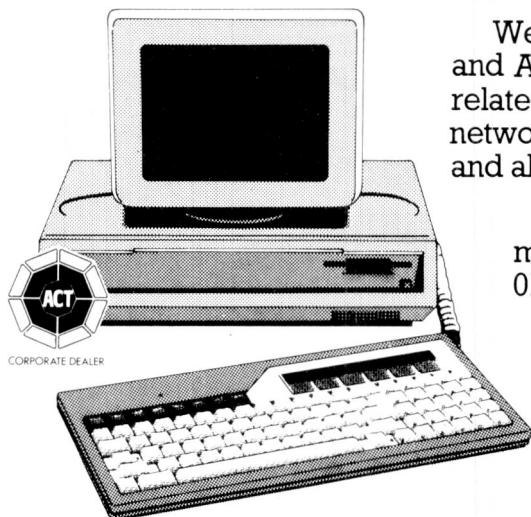
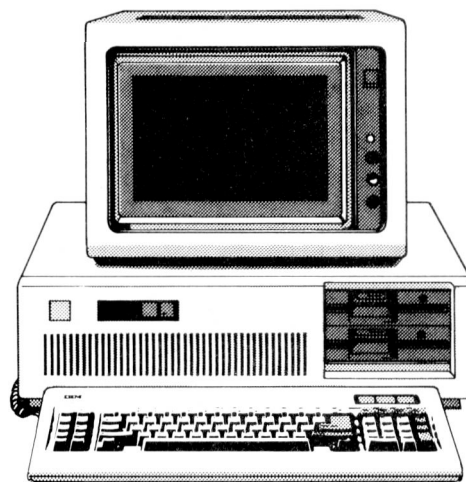
Export, Educational, Dealer, Governmental, Lease, Rent, Consultant ENQUIRIES WELCOME. All items new and carry manufacturers guarantee. Prices are exclusive of Installation, Training, Delivery and subject to change without notice. Delivery £10 for each item in UK, £75 for Europe.



# IBM+ACT WITH EXTRAS

Now  
available  
for Rental

- \* Accurate analysis of your requirements
- \* Highly competitive pricing
- \* Wide range of compatible software
- \* Staff training facility
- \* Rentals service available
- \* Try before you buy – we refund 95% of your rental if you purchase within first month of rental
- \* Trade-in on existing systems
- \* Expert installation service
- \* Micro data-transfer service



We specialise in networking your IBM PC's and Apricots together using the manufacturers' related products. These include IBM networking and clustering hardware and software and also the Point 7 and Point 32 from ACT.



As well as hardware from the leading manufacturers, you'll get friendly help and advice from 01 Computers, one of Britain's acknowledged experts.

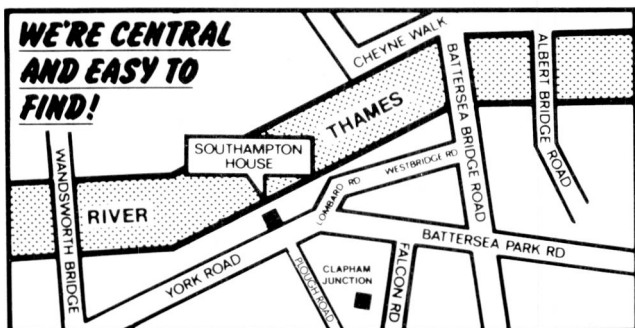
And since we also handle the New Innovative Smart Integrated Business software package, we can really help you turn your personal computer into a powerful business tool.

Send in the coupon and find out how.

## 01 COMPUTERS LTD.

Southampton House, 192-206 York Road, London SW11 3SA

Telephone for a FREE demonstration Tel:- 01-228 2207 Telex 8954575 CTC LDN



Fill in this coupon and send it to us at the address below. It's an important first step to answering all your business computing needs.

Name \_\_\_\_\_

Address \_\_\_\_\_

Tel No: \_\_\_\_\_

Occupation \_\_\_\_\_

Southampton House, 192-206 York Road, London SW11 3SA



# MAILBASEtm

## THE NEW LABELLING AND MAILING PROGRAM FROM SAMSON BOND LTD. **COMPUTERISE YOUR MAILING LIST**

- ★ Suitable for Mailshots, Memberships, Sales, Projects, etc.
- ★ Database of 3 Names, 4 Address Lines, Postcode, 1 User
  - ★ Defined Key Field, 6 User Defined Extra Fields
- ★ Integrates with Mailmergetm for Personalised Letters and
  - ★ Produces Labels for Mailings
  - ★ Backing Reports for Telephone Follow Up
  - ★ Selects on any Combination of Fields
- ★ Search/Sort on Three Key Fields, Name, Postcode and User Key Field
  - ★ Easy to Use Menu Driven
  - ★ Clear Documentation
- ★ Runs on any PCDOS, MSDOS, CP/M, CCP/M, Turbodos Micros
  - ★ Standard System only **£75.00 + VAT**
- ★ Fully User Defined Main Screen **£150.00 + VAT**

Available from:

**SAMSON BOND LTD., 11 SUN STREET, FINSBURY SQUARE, LONDON EC2M 2PS**

**Telephone: 01-247 6058**

(MAILMERGE is a trademark of Micropro Ltd.)

YES, PLEASE SEND ME MAILBASE,  
(ENCLOSE CHEQUE FOR £75.00 + VAT)

YES, PLEASE SEND ME MAILBASE DEMONSTRATION  
(ENCLOSE CHEQUE FOR £10.00 + VAT)

YES, PLEASE SEND ME MORE  
INFORMATION ON MAILBASE

Name .....

Position .....

Company .....

Address.....

PLEASE ENCLOSE CHEQUE AND STATE COMPUTER AND OPERATING SYSTEM

Mail to: **SAMSON BOND LTD., FREEPOST, LONDON EC2B 2LJ**

## ACCOUNTING FOR MILLIONS THE MILLION Samson Bond's tried and tested integrated accounting system for microcomputers

the  
**million**

- ★ EASY TO USE — Most people can find their way around without a manual
- ★ COMPREHENSIVE — Full suite of Sales Purchase and Nominal, Sales order and Invoicing, Purchase order and Invoice, Stock Control Management Reports, Budgets and VAT
- ★ REASONABLE PRICE — Only £1000 + VAT single-user, £1995 + VAT multi-user
  - ★ CLEAR DOCUMENTATION — Well presented straightforward manual
  - ★ FAST — Written in PL/I the fastest language next to machine code
- ★ Interfaces with Spreadsheets/Databases/Word Processors. Gives great analysis and reporting power
- ★ We will train and support. Our specialists will take away the headache

Telephone now for details:

**samson  
bond**

**SAMSON BOND LTD**  
11 Sun Street, Finsbury Square,  
London EC2M 2PL  
Tel: 01-247 6058  
Telex: 265871 DRG024-G  
Micromail DRG024

Yes, I would like further information on the **MILLION** system

Name ..... ☐

Position .....

Company .....

Address.....

.....

.....

..... Tel:.....

Post to: Samson Bond, 11 Sun Street, Finsbury Square, London EC2M 2PL





**MICRO CHALLENGE...**  
the first computer-age  
puzzle magazine

No, not another  
computing magazine.

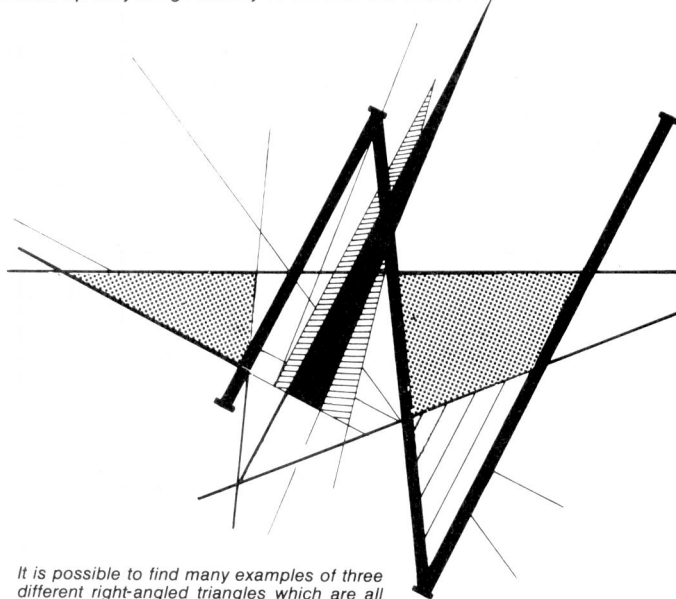
**Micro Challenge is unique. Colourful and exciting,  
it's packed with intriguing puzzles — and prize competitions  
— devised specifically for microcomputer owners.**



This is an example of one of the many types of puzzle to be found in Micro Challenge — but it's also your chance to win a superb JVC portable colour television with remote control. Solve the problem, using skill, judgement and your own micro, then send the solution, on one of the prize puzzle entry forms from the May/June issues of Micro Challenge, to the address given in the magazine, marking the coupon AP1. (A proper form must be used; no photocopies or facsimiles are permitted). The competition closes first post on June 17, 1985, and the first correct entry opened wins the prize.

## TRIANGLE TANGLE

Brush up on your geometry to unravel the answer.

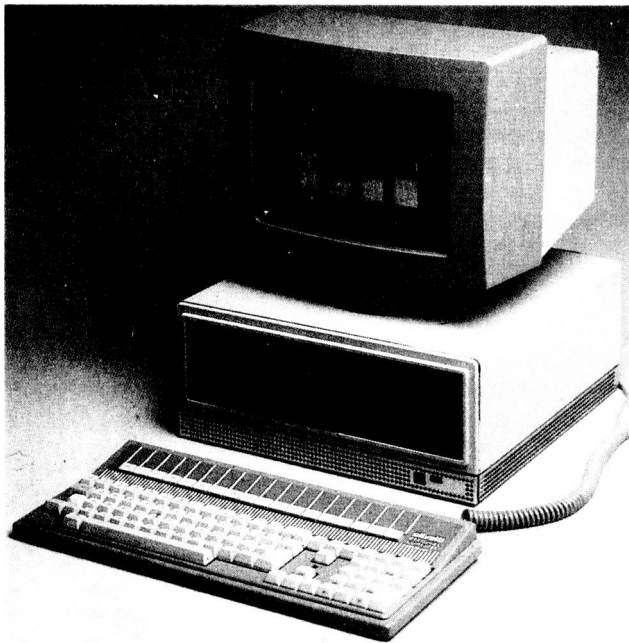


It is possible to find many examples of three different right-angled triangles which are all equal in area. Can you, however, find three such triangles for which every side is a whole number of units (an integer)? Try to devise a program to find the trio with the smallest possible area.

Moving at the speed of light you could still snap up our fabulous launch issue. Order a regular copy from your newsagent now. Details of subscriptions or postal deliveries contact:  
**MICRO CHALLENGE**  
Somers House, Linkfield Corner, Redhill, Surrey  
RH1 1BB



# I DON'T BELIEVE IT!!!!



**olivetti**

*Save over £1000  
on the*  
**OLIVETTI M24**

**+ 10 Meg Hard Disk  
+ 640K RAM**

**ONLY £2450** (ex-VAT)

Ask about our discounted software, delivered anywhere in the UK. Telephone for more information on York 0904 39449 — ask for David.

Why not visit us in York where history, culture and technology meet.

**MICRO-BRIDGE of YORK 0904 39449**  
**75 GOODRAM GATE, YORK, Nth YORKSHIRE**

## Have you put a **CLIP** in your Winchester?

**CLIP — Compressed Library Interchange Program**

**CP/M CP/M-86 PC DOS MS DOS £105.00**

- **Backs up a Winchester on to floppies.**
- **Compresses text or data to less than half size.**
- **Large files can span multiple discs.**
- **Selective backup or retrieval, on an inclusive or exclusive basis.**

**CLIP** has no equal in reputation, convenience, power or economy.

**CLIP** comes standard with Winchester systems supplied by Olympia, Cifer Systems, Research Machines and Philips, British Telecom. And is highly recommended by other major manufacturers

### **EFFORTLESS BACKUP**

You can save commands for later use, or type commands directly.

**CLIP** has its own menu, with seven prepared commands. Customise the commands if you wish, or edit the menu text with a word processor. Or keep the standard forms. All your housekeeping — save/restore/review — by pressing two keys.



**KEELE CODES LTD**

University of Keele, Keele, Staffordshire, U.K. Tel: (0782) 629221 Telex: 36113

All prices excl. VAT, post free in U.K.  
Most popular disc formats from stock.



## WE'LL BEAT ANY PRICE BY £10

If you can buy any computer, software or printer at a lower price than ours, we'll beat it by £10 — guaranteed. To qualify simply provide a written quotation from an authorised dealer. We accept official orders from UK Government and Educational Establishments.

### EXPORT SPECIALISTS

4% EXTRA DISCOUNT FOR 2 OR MORE!

#### APRICOT

F1 256K	945
PC 2X 315K	1308
PC 2X 720K	1472
Portable 256K	1472
Portable 512K	1882
Xi 10MB	2292
Point 32 10MB	2456
MSD 10MB	1062
9" MON	164
12" MON	205
10" Colour Mon	324
Mouse cordless	78
128K Board	165
256K Board	324
512K Board	652
Modem Board	242
Printer 08	136

#### IBM P.C.

PC 64 1X360K	934
Portable 2X360K	1648
PCXT 10MB	2318
PC 64 10MB	1750
Portable 10MB	2230
PC AT/ATE	Call
360K Drive	243
PC Keyboard	151
AT Keyboard	Call
Mono display	153
Mono/Printer adap.	148
RGB Colour Mon	405
Colour adap.	159
Parallel adap.	71
64K RAM kit	59
10MB upgrade kit	820
DOS 2-1	48

#### APPLE

MAC 128K	1472
MAC 512K	2128
MAC Drive	286
IMAGE WRITER 10"	316
IMAGE WRITER 15"	430
ACC kit	31
APPLE //e	481
//e & Duo Disk & MON //e	898
Mouse //e	111
APPLE //C	709
//c Drive	188
MON & stand //c	137
Mouse //c	58

#### SOFTWARE

Lotus 123	262
Symphony	399
D Base II	230
D Base III	339
Framework	335
Wordstar	190
Wordstar Prof.	285
Multimate	220
Supercalc 3	210
Multipan	130
Sage accounts	249
Pegasus	185
JAZZ	Call
Apple Works	140
File Vision	140

#### COMPAQ

PC 2X360K	1799
PLUS	3235
PC 10MB kit	2395
Deskpro Mod 2	2128
Deskpro Mod 4	4588
30 MB Drive	Call

#### PRINTERS

Too many printers to list  
— call for best price

01-278 5688/01-833 3831

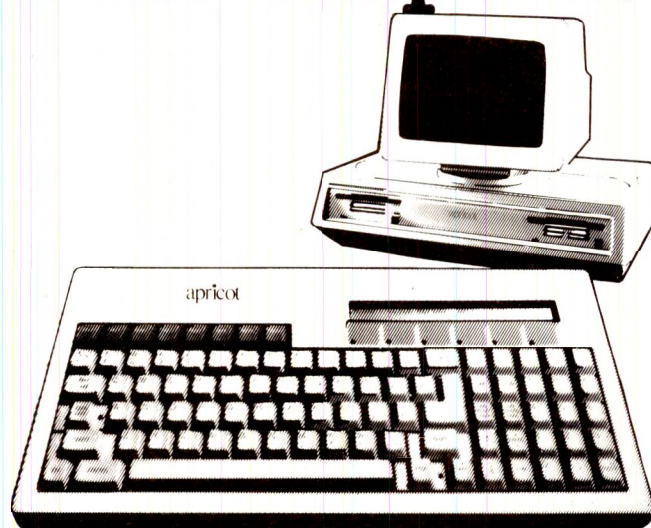
GROUP 18  
LTD

164 Grays Inn Road London WC1  
Telephone: 01-833 3391 Telex: 262005 SILVAL G

All prices  
exclude VAT  
Credit Cards  
attract a surcharge



# Have you looked into renting a micro-computer?



Perhaps you should. If you have a work overflow. A special project. An out-of-service machine. A training course or software demonstration to give. A show or conference. Or a budget to prepare.

The benefits are many. Capital and lines of credit are kept free. You pay for use, not ownership. Payments are predictable and deductible. Cash flow is smoother.

If you don't like your choice, you can try again. If you do, you can apply part of the rental cost to a purchase.

CCA specialise in renting micros. And in giving you the most for your money. To find out more, attach your business card to this advertisement and post it. Or phone if you wish.

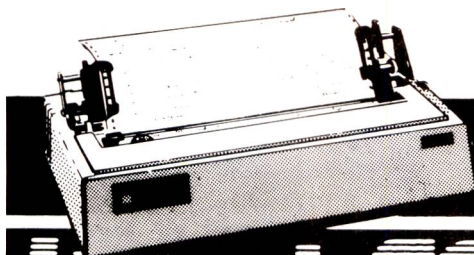
## CCA MICRO RENTALS

**CCA MICRO RENTALS LIMITED**

Unit 7/8, Imperial Studios,  
Imperial Road, London SW6 2AG.  
Telephone: 01-731 4310

PCW



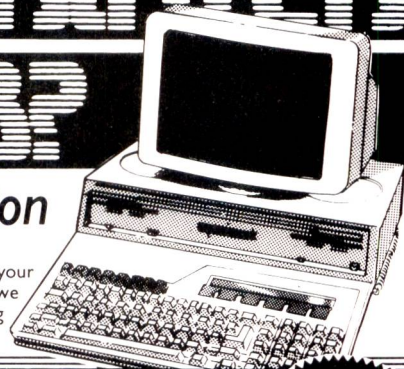


# Which PRINTER FOR What COMPUTER?

## Micro General the Specialists for Printer Selection

Contact us for our expert advice on all your interfacing problems

It's not just a question of plug in and let's go. There are now over 200 different connector situations. How do you know that your computer will accept the printer of your choice? We at Micro General do not sell boxes off the shelf. As computer engineers we help you to choose and install the right printer for your computer. The advice is free and it could save you some embarrassing mistakes - Buy from us for peace of mind.



### MICROLINE



**MODELS FROM  
£299+ VAT**

New Slimline design that's quieter, faster and superbly reliable. IBM PC Version available

- M182 parallel/IBM 120 cps from £299 + VAT
- M192 parallel/IBM NLQ from £399 + VAT
- M193 spec as 192 132 col from £549 + VAT
- NEW 84XS Host of options: Bar coding, 30K buffer, Multi Lingual, Scientific fonts, Qume/Diablo, Arabic.

3 print modes: Draft, Memo & Correspondence from £1295 + VAT

### BROTHER

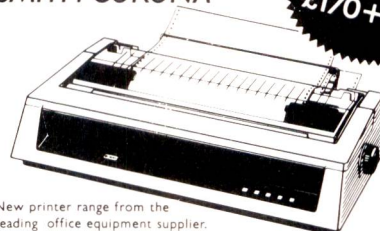


**FREE on site  
maintenance in the UK.  
For all business printers!**

Diablo compatibility, 3K Buffer 2 colour printing.

- HR15 13cps Serial or Parallel £375 + VAT
- HR15 keyboard £150 + VAT
- HR25 25cps Full width 16" £699 + VAT
- HR35 35cps Full width 16" £899 + VAT
- 2024L MATRIX NLQ 80cps, Draft 160cps, Diablo/Epson selectable £999 + VAT

### SMITH CORONA



**from  
£170+ VAT**

New printer range from the leading office equipment supplier. EPSON & IBM selectable

- FASTEXT 80 - 80cps ideal for home user - parallel - £170 + VAT
- D100 - 120cps - parallel - £220 + VAT (Serial interface for F80/D100 - £58 + VAT)
- D200 - 160cps Draft 80cps NLQ Serial & Parallel as standard - £299 + VAT
- D300 - 160cps, 132 col, NLQ 80cps Serial & Parallel interface standard - £495 + VAT

## TRY BEFORE YOU BUY!

Bring your micro to us and match with our range of printers - full workshop facilities available to iron out all technical hitches! CALL US FOR PRINT SAMPLES.

TRADE or PRIVATE CUSTOMERS take advantage of our

### INTERFACING CONSULTANCY

INTERFACES & CABLES AVAILABLE FOR:

VIC 20	NEW BRAIN	COMMODORE 64	OSBORNE
PET	ORIC	TANDY	SIRIUS
SPECTRUM	DRAGON	SHARP	SAGE
SINCLAIR QL and more!			

**INTERNAL & STAND ALONE  
BUFFERS from £65 + VAT**

**PRINTER SWITCHES  
from £65 plus VAT.**



**Now in our 5th year  
of business!**

### APRICOT F1

a full blown business micro

For the first time business user a genuine business machine with some amazing 'high tech' features. - See the Apricot's mouse execute previously complex tasks at a single key stroke, and the new infra-red device means there's no cable connection to the keyboard, giving desk top planning a new meaning.

- 256K RAM 720 single disk.
- MS-DOS
- Rapid Display manipulation and special effects.
- Expansion and Outport facilities.
- Colour/Mono Monitor or VHF for your TV.
- Extremely light (under 13lbs) - totally portable.
- Price includes SuperWriter, SuperCalc, & SuperPlanner software.
- Well over 1000 software packages now available.



**LEASE F1  
from £7 per week  
CALL FOR DETAILS  
DEMO NOW**

### MICRO GENERAL'S Pick of the Printers

Epson RX80T 100cps	£210.00	MP-165 160cps NLQ	£269.00
Epson RX80 F/T 100 cps	£230.00	JUKI 6100 Parallel	£325.00
Epson FX80 160cps	£360.00	JUKI 6300 Serial or Par	£799.00
Epson RX100 100cps	£390.00	SILVER REED 16 Parallel 16cps	£256.00
Epson FX100 160cps	£499.00	SILVER REED 16 Serial 16cps	£279.00
Epson LQ1500 200cps	£999.00	SILVER REED 20 Parallel	£453.00
Canon PW1080A 160cps	£299.00	SILVER REED 20 Serial	£479.00
Canon PW1156A 160cps	£419.00	SILVER REED 36 Parallel	£799.00
Canon Serial I/Face	£79.00	SILVER REED 36 Serial	£825.00
Canon PJ1080A 7-COLOUR	£479.00		
Shinwa CPA-80P Par 100cps	£199.00	<b>OKI HIGH SPEED MATRIX</b>	
Shinwa CPA-80S Ser 100cps	£219.00	OKI 2350 Par. 350cps	£1755.00
Panasonic KC-P1091 120cps	£299.00	OKI 2410 Par. Graphics	£1875.00

#### PLOTTERS

EPSON HI-80 £400.00  
HITACHI 672 £495.00

#### CUMANA BBC DISK DRIVES

CSX100 40T S/Side 100K £109.00  
CSX200D 40T D/Side 200K £119.00  
CSX400 8CT D/Side 400K £166.00  
CD200 2x40T S/Side 200K £259.00  
CD400D 2x40T D/Side 400K £285.00  
CD800S 2x80T D/Side 800K £360.00

#### MICROVITEC 14 COLOUR MONITORS

1431-MS 452 PIXEL BBC £216.00  
1451-MS 653 PIXEL BBC £260.00  
1456-LI 653 IBM, Apricot £395.00  
1456-DQ 653 Sinclair £239.00

• All prices exclusive of VAT.

**MICRO  
GENERAL**

(PCW 6)

Unit 25, Horseshoe Park, Pangbourne, Reading, RG8 7JW Tel: 07357 4466

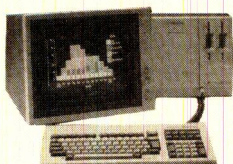
DEALER/OEM ENQUIRIES WELCOME

■ Always call for the best possible price.



Access/Visa





## COMMODORE 64 £140

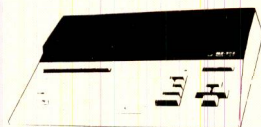
Commodore 64	£140
MSP801 Printer	£160
C2N Cassette	£39
Music Maker	£00

## COMMODORE M801 PRINTER £160

## COMMODORE COMMUNICATIONS MODEM

- 1200/75 V23 Full Duplex Asynchronous operation
- B. T. Approved
- Component software held in 8k ROM

**£85**



## SHARP MZ700 64K RAM £99

## BBC MICRO

Acorn Electron	£99
BBC Model B	£260

## MSX COMPUTERS

SONY HIT BIT 64k RAM	£260
Disk drive	£299

SANYO MPC 100 64k RAM	£199
Joysticks (two Ports)	£13
Light pen	£call

JVC HC-7GB 64k RAM	£225
--------------------	------

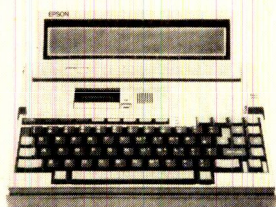
PANASONIC EPSON PRINTERS	
RX80 FT	£259
FX80	£349
FX100	£499
P40	£87
P80	£160

## HEWLETT PACKARD CALCULATORS

HP 11C	£54	HP 12C	£call
HP 15C	£call	HP 16C	£call
HP 75C	£599	HP 71B	£call
Visical pack	£119	Data Com Pac	£144
Text Formatter	£78		
HP 41C	£129	HP 41CV	£call
HP 41CV	£149	HP 41CX	£221
Card Reader	£145		
Printer	£call		
Cassette Drive	£call		

## CASIO COMPUTERS

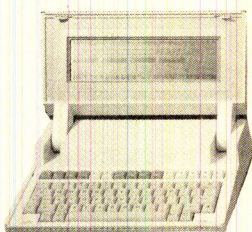
FX 720P	£49
FX 750P	£89
PB 410	£49
PB 110	£39
Ram Card RC2	£19
Ram Card RC4	£29
FP 200 Computer	£299
FP 1011 Printer	£169
FA20 Interface	£79
FA10 Interface	£179
CM1 Cassette	£59
FA4 Interface	£44



**FREE** WORDSTAR  
SPREAD SHEET

**£795**

## EPSON PX-8



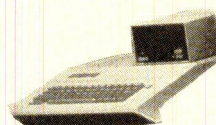
## HEWLETT PACKARD HP110 £2595

## APPLE III SOFTWARE

Applewriter III	£49
MailList-Manager	£49
Visicalc III	£49
Catalyst	£call

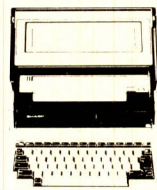


## APPLE IIC PACKAGE 128k RAM MONITOR & STAND £999



## APPLE IIe 64k RAM DD WITH CONTROLLER £599

## APPLE III 256 RAM £999



## SHARP PC 5000

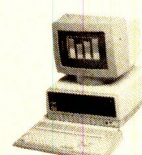
128kb Ram; 64kb Rom, 128 Bubble memory  
Printer  
Super Writer  
Super Calc  
Super con disk

M.R.P. £2,224

£1,699

## MACINTOSH SOFTWARE

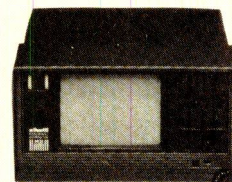
Multiplan	£190	TK Solver	£189
Chart	£145	Word	£179
Basic	£145	OMNIS1	£149
Lotus Jazz	£call	OMNIS2	£295
Copy-Mac	£call	OMNIS3	£399
MacPlot	£90	PFS: FILE	£call
Clickart	£call	DFS: REPORT	£call
Mac the knife	£call	Macforth	£call
Millionaire	£51	MacPascal	£99
Zork I	£36	MacProject	£99
Zork II	£42	Macterminal	£call
Zork III	£42	Macdraw	£call
Witness	£call	Deadline	£call
Hitchhiker's Guide to Galaxy	£34		
Music Composer	£69	MacCalender	£call
Frogger	£34	Trivia	£34
Lode Runner	£call	Funpack	£34
MacGammon	£call	Penstate	£call
Sargon III	£42	Payroll	£call



## OLIVETTI M24 PC

M24: dual 320kb disk drive; 128kb RAM, keyboard

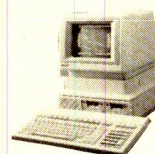
**£1499**



## OLIVETTI M21 PORTABLE PC

PORTABLE COMPUTER  
M21: dual 320kb disk drive monitor

**£1499**



## HEWLETT PACKARD HP-150

HP-150: dual 270kb 3 1/2" disc drive 256kb RAM, keyboard, High resolution (512x390) monitor

**£1899**

HP-150: dual 720kb 3 1/2" disk drive 256kb RAM, keyboard, High resolution (512x390) monitor

**£2299**

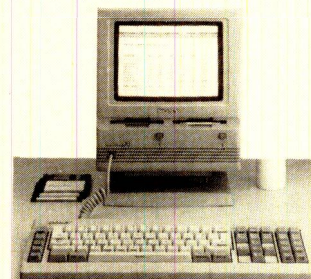
## HITACHI PC

HITACHI PC: dual 320kb floppies 128kb RAM, keyboard, colour monitor, nucleus generator, MS DOS

**£1195**

## COMMODORE PC10

## EXPORT ENQUIRIES WELCOME



## SONY MODEL 10 WORD PROCESSOR

# Tasha

## Business Systems

191 Kensington High Street, London W8

**Authorised Dealer**  
APPLE — COMMODORE — HEWLETT PACKARD — EPSON — SONY — OLIVETTI

**01-937 8529**  
Monday to Saturday 9.30-6.30pm

Tel: 01-937 7896  
01-937 3366

Telex: 946240 (CWEASY G)

MBX No. 19001120

- TBS reserves the right to change advertised prices
- Add 15% VAT
- Goods subject to availability

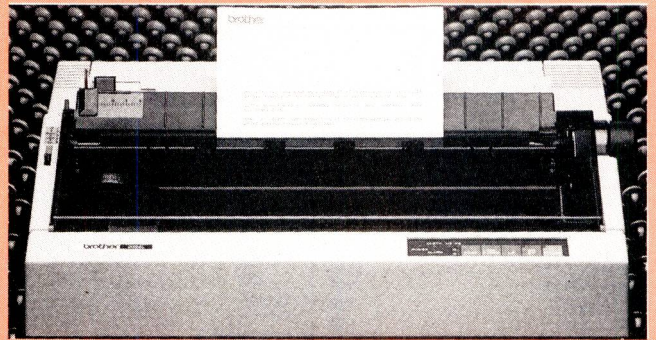


# PRINTERS



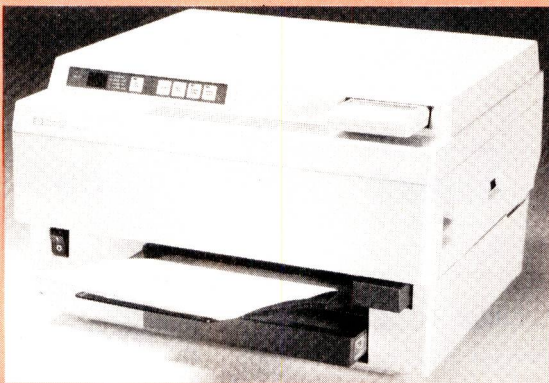
## HEWLETT PACKARD Think Jet Printer

Fast 150 CPS, quiet 50 dBa(A). High print quality, 11×12 charactercell, 96×96 (192) dots per inch. Disposable print head. Pin and friction feed allows you to use single sheets as well as fanfold paper..... £399



## BROTHER 2024L Letter Quality Dot-Matrix

Built-in tractor feed. High speed printing — 96 CPS (LQ Elite), 160 CPS (draft). Up to four carbon copies, bi-directional logic seeking .....£995



## HEWLETT PACKARD Lazerjet Professional Printer

A silent but speedy masterpiece. 300 CPS for best letter quality. Unbeatable resolution whether it is text, charts or diagrams and it's compatible with the IBM PC and wordstar, Lotus packages etc .....£3,595

## HEWLETT PACKARD 7475

The 6 Pin graphic plotters to smarten up any presentation. Accepts A4 or A3 paper/overhead slides and offers a wide choice of colours. It also works with most graphic software  
£CALL

## BROTHER HR15

A superb printer offering high quality daisy wheel print, for an exceptionally low outlay. HR15 offers two-colour printing, shadow printing, proportional spacing, super/subscript and auto-underlining. 50 CPS bi-directional .....£CALL

## BROTHER HR35 Daisy Wheel Printer

Specifically developed for the office that demands a high output of high quality printing. 7K bytes buffer, two-colour printing, super/subscript, 35 CPS, auto-underlining, bold printing ..... £CALL



## BROTHER TC600 The Teleprocessor

The Brother TC600 puts a computer telecommunications system in your briefcase. Not a computer, not just a portable electronic typewriter, but a fully functional telecommunications terminal that incorporates many of the advanced word processing features found on desktop models.....£415

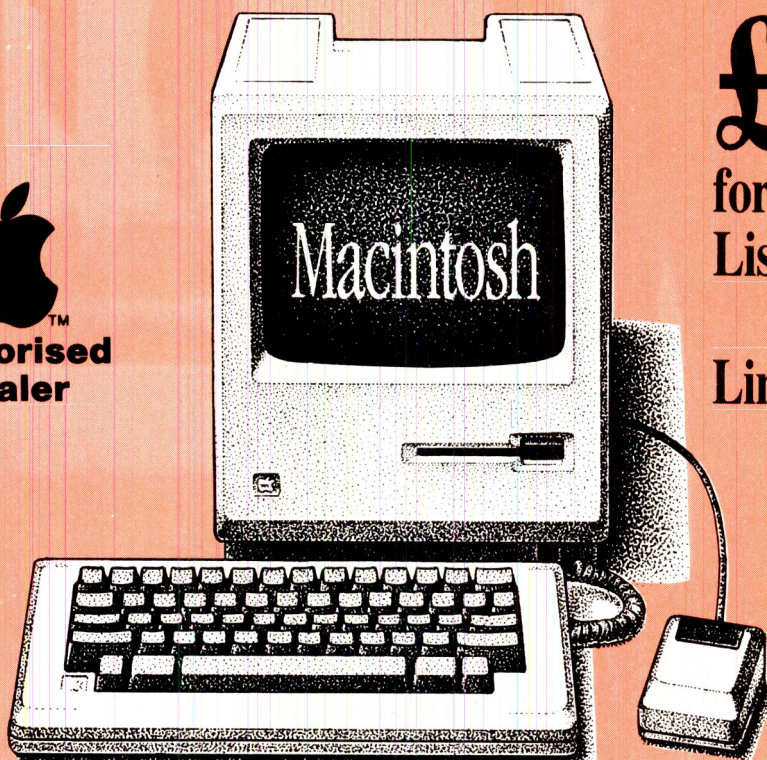
HR5.....£154 M1009.....£189

**Tasha**  
Business Systems





# SAVE £700 on 512K Macintosh



**£1895**  
for 512K Macintosh  
List Price £2595

**Limited Stock!**

## Jazz does it all

Need to send or receive information from another computer? Write letters, reports or proposal? Tests assumptions or perform complex "What if" calculations? Draw a graph of the result? Will you need to add new capabilities as your business grows? Jazz does all this and more on the spot.

### Tasha Business Systems

191 Kensington High Street, London W8  
Tel: 01-937 3366/8529  
Telex: 946240 (CWEASY G)  
MBX No. 19001120

Goods subject to availability  
Add 15% VAT  
TBS reserves the right to change advertised price

**ORDER LINE**

**01-937 8529**

# Tasha

**Business Systems**



#### EXAMPLE PRICE

64K PC.....	1139
Keyboard.....	185
Second Drive.....	297
Mono Adapter.....	181
Mono Display.....	186
DOS 2.1.....	59

Upgrade to 640K FREE

TOTAL COST      £ 2047

Phone for your configuration quote



**640K Upgrade Free**  
Including — Serial Port, Clock/Calendar, plus battery back-up,  
Parallel Port, Silicon Disk, and Print Spooler  
With IBM-PC, XT And Compaq Complete Systems

# LIMITED OFFER!

## Please Phone Your Nearest Branch

**NORTH LONDON** 637, HOLLOWAY ROAD LONDON N19 5SS 01-281 2431

**SOUTH LONDON** 67, WESTOW STREET, UPPER NORWOOD LONDON SE19 3RW 01-771 6373

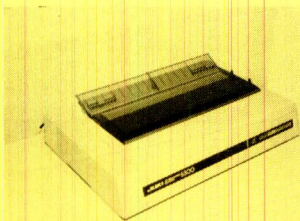
**MIDLANDS** 14, CHARLES STREET, HANLEY STOKE-ON-TRENT ST1 3AR (0782) 269 883

# MICROWARE





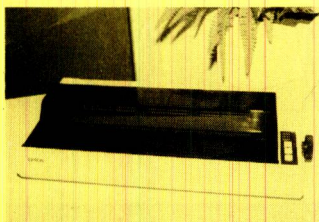
## PRINTERS



### JUKI PRINTERS

An exceptional range of high quality, low cost daisywheel printers.

● Juki 6300 .....	£699
● Tractor Feed .....	£135
● Juki 6100 .....	£350
● Tractor Feed .....	£125
● Serial Int .....	£50
● 2200 + Keyboard .....	£245



### EPSON PRINTERS

Market leaders in dot matrix printers, including the new JX80 colour printer and H180 plotter.

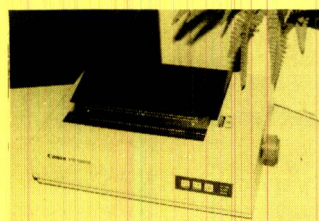
● FX100 + .....	£495
● RX100 .....	£399
● FX80 + .....	£399
● RX80 FT + .....	£255
● JX80 Colour .....	£445
● H180 Plotter .....	£399
● HP Int. for H180 .....	£99
● LQ 1500 .....	£995
● Feeder for LQ1500 .....	£365
● Tractor for LQ1500 .....	£52
● Tractor for FX80 .....	£38



### BROTHER PRINTERS

Highest quality medium speed daisy-wheel printers. Complete range of accessories. Superb letter quality on new 2024 NLQ dot matrix.

● HR15 Daisywheel .....	£399
● HR25 Daisywheel .....	£675
● HR35 Daisywheel .....	£999
● Sheetfeeders .....	£220
● Tractors .....	£99
● 2024 Letter Quality .....	£999



## CANNON PRINTERS

Value for money dot matrix NLQ printers. Feature reverse feed tractor for labels and forms.

● 156 Column .....	£359
● 80 Column .....	£299

## NEC PRINTERS

Top of the range hard wearing printers, suitable for long periods of continuous use.

● 3550 IBM Comp .....	£1,199
● 7700 High Speed .....	£1,595
● 8800 IBM Comp .....	£1,795
● T Switch .....	£79
● Printer Cables .....	£25

Full range of ribbons and wheels stocked. Ask about our unique genuine A4 continuous stationery.

## SOFTWARE



## WORD PROCESSING

Increase the efficiency and productivity of your paper flow. Standard letters, multi-lingual, multiple copy, spell checkers and address merging.

● Wordstar .....	£245
● Mailmerge .....	£125
● Spellstar .....	£125
● Microsoft Word .....	£245
● Mouse for above .....	£175
● Wordcraft .....	£399
● Disp/Write 1 .....	£82
● Disp/Write 2 .....	£250
● Writing Assistant .....	£95
● Easy Writer .....	£95
● Multimate .....	£375
● Perfect Writer .....	£45
● Typing Tutor .....	£49

## DATA BASES

Increase the accuracy and speed with which you can find facts, records and figures. We specialise in modifying DBASE to provide you with up to the minute management reports and information at the touch of a button.

● DBASE II .....	£295
● DBASE III .....	£450
● DBASE Programs .....	Call
● Delta .....	£455
● DMS .....	£175
● DGRAPH III .....	£295
● Cardbox Plus .....	£295
● Filing Assistant .....	£95
● Everyman .....	£395

## PROJECT MANAGEMENT

Produce resource scheduling/project plans. Create GHANT and PERT diagrams, critical path, cashflow forecasts and completion dates.

● Pertmaster 1000 .....	£525
● Pertmaster 2000 .....	£999
● Hornet 4000 .....	£2,500

## SPREADSHEETS

Produce financial reports and forecasts with graphical presentation, including 'What If' calculations and models. Full management accounts and statistical models can be compiled to your specification. A large range of standard models kept in stock.

● Lotus 123 .....	£345
● Multiplan .....	£137
● SuperCalc III .....	£295
● FT Moneywise .....	£325

## MULTIPURPOSE

Combine graphics, database, word-processing, spreadsheet and communications all in one program.

● Framework .....	£450
● Symphony .....	£450
● Open Access .....	£395

## ACCOUNTING

Pegasus Single/Multi-User  
Market leaders in accounting software. This product is well proven with thousands of installations nationwide. All modules can be integrated for accuracy and time saving. A file transfer utility allows you to use data from your accounts in a spreadsheet in order to create up to the minute forecasts and reports.

● Sales .....	£295
● Purchase .....	£295
● Nominal .....	£295
● Invoicing .....	£295
● Payroll .....	£295
● Jobcosting .....	£295
● Bill of Material .....	£295
● Stock Control .....	£295

Discounts for more than one module purchased at a time.

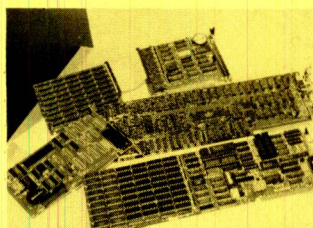
## UTILITIES

For communications or file handling:

● Sidekick .....	£69
● Xenocopy .....	£149
● Apple T/O .....	£249
● Crosstalk .....	£129
● Norton Utilities .....	£89

We stock hundreds of different software products in each of our stores. Demonstrations available by appointment our premises or yours.

## ADD ONS



## MULTIFUNCTION CARDS

Increase the power of your system with the latest state of the art hardware upgrades.

● 64K RAM Upgrade .....	£45
● Serial/Parallel Int .....	£87
● 384K RAM Card includes Clock, Battery + 64K .....	£249
● MAXI CARD includes Clock, Battery, Calendar, Games Port, 2 Serial + 1 Parallel Port, Spooler and Silicon Disk .....	£275

## GRAPHICS

Use graphics in monochrome, or view Lotus/Symphony graphs before printing.

● Hercules Card .....	£350
● High Graph Card .....	£299
● Amber Mono Display .....	£225
For high resolution colour (640x400) pixels.	
● Tecmar Card .....	£695
● Dazzler Card .....	£745
● Quadram Monitor .....	£769
● Microvitec Monitor .....	£640

## DISK UPGRADES

Upgrade your PC instead of replacing your system. All prices include fitting.

● Dual 360K Half HT .....	£295
● Dual 820K Half HT .....	£395
● 10 MB + Controller .....	£899
● 20 MB + Controller .....	£999
● 45 MB Tape backup .....	£1,495

## NETWORKING

Your stand alone systems can be networked to share data, programs and resources.

● IBM Cluster/Stn .....	£399
● PC Net/Stn .....	£450

## MODEMS

● Pace Multifunction .....	£137
● Datacom .....	£295
● Telebox .....	£1,295
● Braid System .....	£1,595

## ORDERING INFO:

PLEASE SEND ME INFORMATION ON

- ☐ SYSTEMS
- ☐ PRINTERS
- ☐ SOFTWARE
- ☐ ADD ONS

Name \_\_\_\_\_

Address \_\_\_\_\_

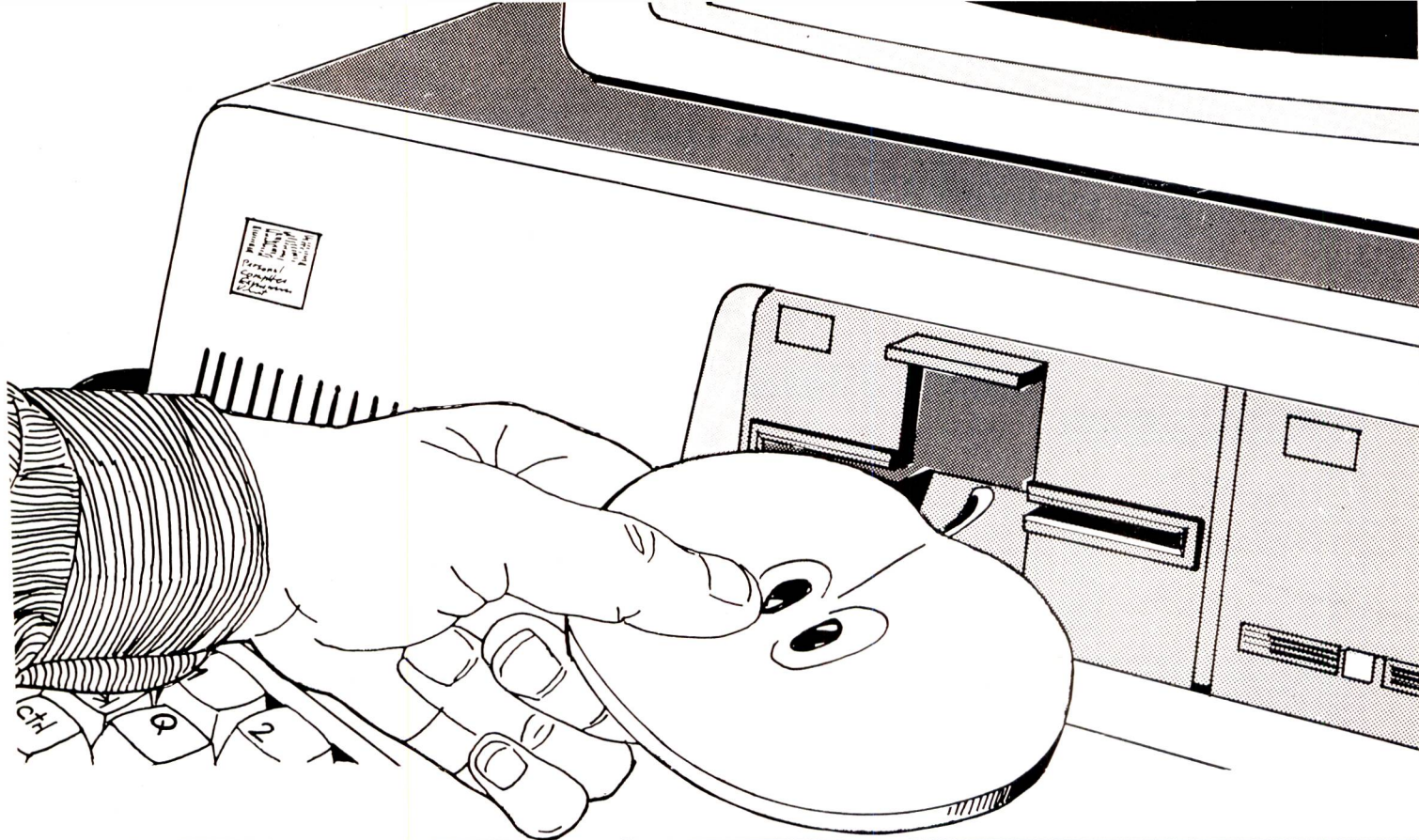
Tel: \_\_\_\_\_

**Midlands**  
14 Charles Street, Hanley  
Stoke-on-Trent  
(0782) 269883

**North London**  
637 Holloway Road  
London N19 5SS  
01-281 2431

**South London**  
67 Westow Street  
Upper Norwood  
London SE19  
01-771 6373





# UDM makes it possible!

## READ, WRITE, and FORMAT APPLE disks in the IBM PC

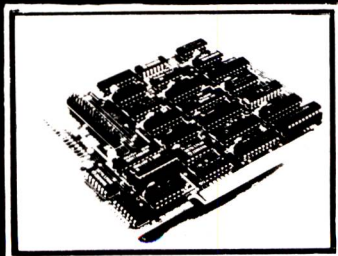
**No modems. No serial links. No hassles. Say Goodbye to the TOWER OF BABEL.**

READ, WRITE, and FORMAT APPLIEDOS 3.3 and APPLE CP/M disks in your IBM-PC/XT or compatible. Transfer files to an APPLE disk and take your work home (when you need to) and then transfer the updated files back to an MS-DOS disk. Quickly, accurately, and effortlessly. Serial-file transfer methods can take hours. APPLE-TURNOVER takes only minutes.

All you need is the APPLE disk. All transfers are accomplished on the host computer. No need for modems, cables, or expensive down-loading services. The included software is menu-driven and easy to use. Options allow complete flexibility. Installation of the APPLE-TURNOVER printed circuit card takes just a few minutes and will not interfere with normal computer activities.

Make your APPLE deliciously more useful and a productive partner to your PC. Quick and easy file transfers will open a new world of productive applications. Finally, computer incompatibility can be a thing of the past. The Tower of Babel-like scenario that has plagued the microcomputer industry for so long can be conquered with the product you hold in your hands... APPLE-TURNOVER.

**REQUIREMENTS:** IBM-PC/XT and compatibles need 128K of memory and two disk drives (hard disk OK) running PC or MS-DOS with one expansion slot for installation of the APPLE-TURNOVER half-size board.



## APPLE TURNOVER™

# UNITED DISK/MEMORIES

STANHOPE HOUSE  
FAIRBRIDGE ROAD, LONDON N19 3HP

## 01-281 2438

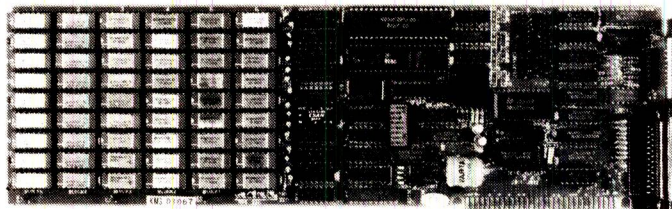
DESIGNS THAT DELIVER  
**UDM**



# Maximize your PC

The UDM Maxi-Card contains all of the most asked for IBM PC support features on one card. This means you get maximum performance at a miserly price.

Features are designed for your convenience. 64K RAM memory comes installed. The memory section is fully socketed and can be expanded to 384K. Our parallel interface can be used for either a printer or bidirectional I/O. Two RS-232C interfaces can be used on the Maximizer; the first is fully installed. The second is optional and fully socketed. The serial interfaces can be addressed as DOS COM1 and COM2 or write your own software and configure them as COM3 and COM4. The clock/calendar has a battery backup to keep the clock running when your system is turned off. Our optional game control adapter supports four paddles or two joysticks.



## STANDARD FEATURES

- 64K expandable to 384K RAM memory
- Parallel interface for printer or bidirectional I/O
- One RS-232C serial interface port
- Clock/calendar with battery backup
- SoftDisk, a RAM disk
- Spool, a printer spooler

## OPTIONAL FEATURES

- Second RS-232C serial interface port addressable as COM3 or COM4
- Game control adapter—4 dimensions, 4 keys

*All Internal Cables Included*

*Fully Compatible with IBM Hardware and Software*

*One Year Warranty*

**Dealer inquiries welcome**

# UNITED DISK MEMORIES

STANHOPE HOUSE  
FAIRBRIDGE ROAD, LONDON N19 3HP

# 01-281 2438



## Tiger Software

**BBC GAMES  
& IBM PC  
SOFTWARE**



### GUN BLAZE (BBC 32K)

**'IRRITATING'**

- You are in command of four laser guns in space.
- Each gun has a limited number of shots and can survive only a limited number of enemy fire.
- Destroy the 'Irritators' before they destroy you!

CASSETTE £4.99  
DISC (40/80) £6.49

### SPACE ACE (BBC 32K)

**'FRUSTRATING'**

- Weave through the red enemy and **TRY** to achieve 'Space Ace' status by obtaining 100,000 points!
- Six speeds of play to choose from.

CASSETTE £3.99  
DISC (40/80) £5.49

### CONVOY SEARCH (BBC 32K)

**'METHOD & LUCK'**

- From your submarine find the convoy.
- When the convoy of 10 ships is found, try to sink it.
- After the attack — any surviving ships attack you!

CASSETTE £3.99  
DISC (40/80) £5.49

### THE BLUE PATH (BBC 32K)

**'RAPID DECISIONS'**

- Find the hidden blue path.
- Can you reach the maximum path score?
- Can you do it before time runs out?

CASSETTE £2.99  
DISC (40/80) £4.49

**GAME PRICES INCLUDE P&P**

Post orders to:

**TIGER SOFTWARE**  
58 SHELburne ROAD  
HIGH WYCOMBE  
BUCKS HP12 3NQ  
Telephone: (0494) 28297

**DEALER ENQUIRIES WELCOME**

Please send me:

GUN BLAZE ON CASSETTE

☐ DISC 80 ☐ DISC 40 ☐

SPACE ACE ON CASSETTE

☐ DISC 80 ☐ DISC 40 ☐

CONVOY SEARCH ON CASSETTE

☐ DISC 80 ☐ DISC 40 ☐

THE BLUE PATH ON CASSETTE

☐ DISC 80 ☐ DISC 40 ☐

— BOX(ES) DISCS 40 TRACK ☐ @ £15.50 EACH INC. P&P

— BOX(ES) DISCS 80 TRACK ☐ @ £22.50 EACH INC. P&P

### ★ SUPERB VALUE 5 1/4" FLOPPY DISCS ★

- 100% certified and error free.
- Single/double sided.
- Single density — although we use them sometimes with the BBC/Solidisk DDFS hardware — and permanently on the IBM — in double density mode!
- Complete with full set of labels.

BOX OF 10 DISCS:

**40 TRACK £15**

**80 TRACK £22**

Plus 50p post & packing per box.

All prices include VAT

NAME .....

ADDRESS .....

.....

.....

I ENCLOSE £ .....

CHEQUE/PO .....

PCW6



Crestmatt challenge you to find a better deal.

**Apricot F1 £1095+VAT**  
256k business system  
1x720k double-sided d/d  
**FREE** 12" monitor  
**FREE** SC Fastext 80 printer  
**FREE** tractor feed/cable  
SuperWriter w/processor  
SuperCalc spreadsheet  
SuperPlanner  
GSX graphics utility  
ACT Diary  
ACT Sketch

**Apricot PC £1595+VAT**  
256k business system  
2x315k disc drive  
**FREE** 9" ACT monitor  
**FREE** MT80+ printer/cable  
SuperWriter w/processor  
SuperCalc spreadsheet  
SuperPlanner  
**FREE** 10 blank discs  
**FREE** box of paper

**Olivetti M24 **  
128k business system  
fully IBM compatible  
12" mono display,  
keyboard and MSDOS  
2x320k d/drive  
**FREE** MT80+ printer & cable  
**FREE** 128k expansion  
**FREE** 10 discs  
**FREE** box of paper

**ITT XTRA**  
STC authorised dealer

**Compaq Portable  
£2195+VAT**  
256k business system  
fully IBM compatible  
2x320 k disc drives  
**FREE** Lotus 123 s/sheet



authorized software  
dealers for AshtonTate,  
SageSoft Pegasus,  
CashLink, Anagram,  
SAM, MicroPro, &  
CompSoft.

**Apricot PC £1795+VAT**  
256k business system  
2x720k double-sided d/d  
**FREE** 9" Apricot monitor  
**FREE** Epson RX80FT printer  
**FREE** printer cable  
SuperWriter w/processor  
SuperCalc spreadsheet  
SuperPlanner  
manuals/documentation for  
MSDOS, MSBASIC plus  
standard utilities  
**FREE** 10 blank discs  
**FREE** box of paper

**olivetti**  
authorised dealer

**COMPAQ**  
authorised dealer



Crestmatt packages  
may be reconfigured to  
suit individual business  
needs. We provide  
demonstration,  
support and  
training with  
on-site maintenance  
contracts available.

**Crestmatt Limited**  
67a York Street (Baker St )  
London W1H 1PQ  
**01.402 1254/5**  
**01.723 4699**

telex 265871 (MONREF G)  
quote ref81:DRG015  
export and mail order  
enquiries welcome  
Mon/Fri 9.30-7;  
Saturday 10.30-4

offers strictly one month  
prices subject to change  
without notice; goods  
subject to availability  
  
add VAT at 15% to all prices

printers

call for latest bargains  
**Printers: dot matrix**  
Mannesmann Tally MT80+  
Shinwa CPA80 100cps (p) 2k  
Epson RX80FT 100cps  
Epson FX80 160cps  
MP 165cps 72 corresp  
Kaga Texan 160cps 27nlq  
Canon PW1080 160cps  
Canon PW1156 160cps  
SmithCorona D200 160cps  
SmithCorona D300 wide  
SmithCorona FASTEXT 80cps

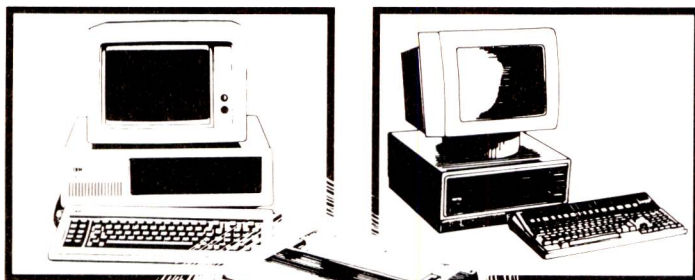
**daisywheel**  
Juki 6100 20cps  
QuenData 20cps  
Brother HR15 13cps  
Brother HR25 25cps  
Brother HR35 35cps





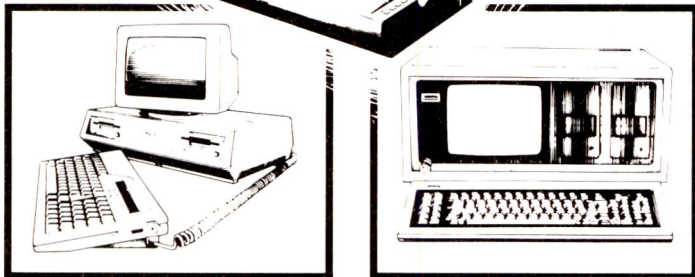


# If in doubt, try renting first...



IBM AT, XT, PC

OLIVETTI M21 & M24



FULL RANGE OF APRICOTS

COMPAQ PC, PLUS & DESK PRO

## with the best — Silicon Valley

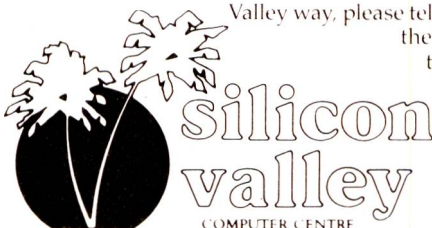
If you're not sure whether to computerise or what hardware to choose, or where to go for the best advice and service — come to Silicon Valley.

We are one of London's largest micro dealers with over 7 years trading experience behind us. And we intend trading for many years to come, which means we are not the cheapest.

We offer you unrivalled service and value for money. We supply hardware, software, training and insurance with full back-up support and maintenance.

As authorised dealers for ACT, Apple, Compaq, Olivetti and of course IBM, we have a reputation to protect. So we don't cut corners — in fact you will be surprised at how much extra you get with Silicon Valley.

To find out more about renting the Silicon Valley way, please telephone or send off the coupon below using the FREEPOST address (Silicon Valley will pay the postage — you do not need a stamp).



164 Grays Inn Road, London FREEPOST WC1X 8BR  
Tel: 01-833-3391 Telex No 8813271 GECOMS G

For further details and a full 100% rebate on our rental scheme, complete this coupon and return.

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Telephone No: \_\_\_\_\_



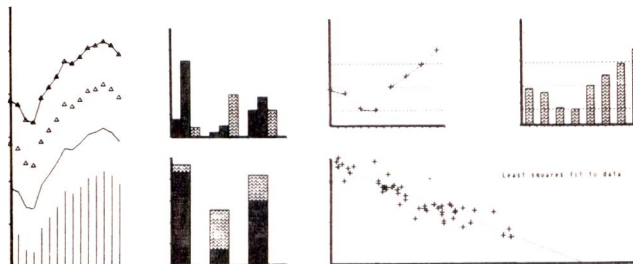
### HI-RES GRAPHICS ON-SCREEN

#### DIRECT from **dBASE** (II & III) programs

The data base Graphics Extension (dGE) adds 28 new functions to dBASE, allowing you for the first time to generate hi-res graphs and charts on-screen directly from dBASE programs.

PRICE: dGE-2 for dBASE II **£90 + VAT**  
dGE-3 for dBASE III **£120 + VAT**

Versions: SIRIUS/VICTOR, APRICOT, IBM + Col/Graphics or Hercules



**Bits Per Second Ltd.**

9 Sudeley Terrace, Brighton BN2 1HD  
Telephone: (0273) 699720

## ChipChat

### Modem

ChipChat modems are the most versatile and up to date available at the price. With autoanswer as standard and intelligent autodial with speed conversion as an option, **ChipChats** may be used to access computers and databases such as Prestel, Micronet, HomeLink and BT Gold.

**ChipChats** support the CCITT V21 protocol: 300/300 baud and the V23 protocol: 1200/75, 75/1200 and 1200/1200 (half duplex). Where local regulations permit, Bell standard operation may be used for dialling US databases.

**ChipChats** use the latest technology and provide valuable extra features such as auto-disconnect to save your telephone bills, and speed conversion for operation with IBM PCs. A full complement of LEDs monitor data flow and the status of handshake lines on the Cannon D-type connector.

<b>ChipChat</b> CC2123A	Autoanswer	£130.35	<b>(£149.90 inc VAT)</b>
<b>ChipChat</b> CC2123AD	Autodial	£165.13	<b>(£189.90 inc VAT)</b>
	P&P	£2.70 + VAT	Approval Applied For



## Digisolve

Digisolve Limited  
Aire and Calder Works  
Cinder Lane, Castleford, West Yorks WF10 1LU  
Tel: 0977 513141/4 Telex 557661 AGRAM G



PROHIBITED FROM DIRECT OR INDIRECT CONNECTION TO ANY TELECOMMUNICATION SYSTEM RUN BY BRITISH TELECOMMUNICATIONS ACTION MAY BE TAKEN AGAINST ANYONE DOING SO



**I.S.C.**

# Offer the UK's lowest prices on computer systems

APRICOT TWIN315K and monitor .....	£1,350
APRICOT TWIN720K and monitor .....	£1,500
APRICOT XI 5MB and monitor .....	£2,000
APRICOT XI 10MB and monitor .....	£2,150
APRICOT F1 720K Excl monitor .....	£850
APRICOT XI IOS (+ monitor) .....	£2,775
APRICOT XI 20S (+ monitor) .....	£3,455
APRICOT XI 20 (+ monitor) .....	£3,115
APRICOT point 32 10MB (+ monitor) .....	£2,395
APRICOT point 32 20MB (+ monitor) .....	£3,395
COMPAQ PORTABLE .....	£1,870
EPSON RX80 F/T .....	£210
EPSON FX80 .....	£310
EPSON RX100 .....	£330
EPSON FX100 .....	£400
EPSON DX100 .....	£340
WORDSTAR .....	£190
LOTUS 1-2-3 .....	£310
D-BASE II .....	£225
PEGASUS .....	£175
CANON PW1156A .....	£399

All products carry 12 months full guarantee, with **HOTLINE** phone support.

Prices exclude only VAT and delivery.

We **GUARANTEE\*** the lowest prices!

## I.S.C. LIMITED

## COMPANY SERVICES INCLUDE:

CUSTOMISED DATABASE SYSTEMS, MAINTENANCE CONTRACTS, INSTALLATION CONTRACTS, NETWORK SYSTEMS, MULTI-USER SYSTEMS.

## FINANCING:

CASH, LEASE-RENTAL, LEASE-PURCHASE, SHORT-TERM RENTAL, HIRE-PURCHASE, PERSONAL LOANS, INSTANT CREDIT (subject to status).

\* Provide a currently advertised lower price within 7 days of purchase and difference will be refunded.

Call for IBM prices.

TRADE AND EXPORT  
ENQUIRIES WELCOME

**GRAPHIC HOUSE, 88 WAVENEY ROAD  
ST IVES, CAMBS PE17 4FW  
TEL: 0480 300533**

**PHONE NOW: 01-729 7033  
— DON'T DELAY**

### APRICOT

F1 898 .....	
PC 2x720K .....	£1,472
PC 2x315K .....	£1,308
Xi 10Mb .....	£2,292
Portable 256K .....	£1,472
Portable 512K .....	£1,882
Point 32 10Mb .....	£2,456
9" Mon .....	£164
12" Mon .....	£205

### PRINTERS

FAR TOO MANY  
TO LIST  
CALL FOR BEST  
AVAILABLE PRICE

### APPLE

Mac 128K .....	£1,472
Mac 512K .....	£2,128
Mac Drive .....	£286
Imagewriter 10" .....	£316
Imagewriter 15" .....	£430
Acc. Kit .....	£31
Apple IIe .....	£481
Apple IIc .....	£836

### COMPAQ

PC 2x360K .....	£1,799
Plus .....	£3,235
Deskpro 1 .....	£1,756
Deskpro 2 .....	£2,128
Deskpro 4 .....	£4,588
10Mb Fixed Disk .....	£1,800
Asyn. Comms. Adapter .....	£70

### SOFTWARE

dBase 2 .....	Lotus 1-2-3 .....
dBase 3 .....	Symphony .....
Pegasus .....	£185
WordStar .....	£190
Multimate .....	£341
Framework .....	£339
Jazz .....	£446

# ATT

(T.I.) INDUSTRIAL UNITS  
STANWAY STREET  
LONDON N1 6RY

Telex: 296119 AATALX G

Callers by appointment

All prices exclude VAT

**SPECIALISTS IN EXPORT**



**PLUS FULL RANGE OF IBM  
COMPATIBLES INCLUDING**

**THE NEW  
COMMODORE PC**

**PC 10**

**PC 20**

**IF IT'S AVAILABLE  
WE WILL GIVE  
A QUOTE!**

**PHONE NOW!  
01-729 7033**



# UCSD Pascal: the MacAdvantage!

Now you can develop software for the Mac, on the Mac itself, in the language that programmers love:

UCSD Pascal. The original. In a revolutionary new package called MacAdvantage. Enhanced to allow you to include **all** the Mac ROM routines in your programs. Like pull-down menus, graphics, desk accessories and mouse routines.

There's a powerful new mouse-based Editor. You can Cut, Paste and Copy with the mouse, and work on two files simultaneously.

We've included some useful program tools to make your job easier. Like the Symbolic Debugger and the Library routines.

Minimum Macintosh requirements are just 128K RAM, and a single floppy disk drive.

It's made possible by TDI Software Ltd, distributors of the UCSD P-SYSTEM micro-computer software development environment praised by

novice and professional programmers alike.

The P-SYSTEM offers more than MacAdvantage. Also available is our full P-SYSTEM Designer Series.

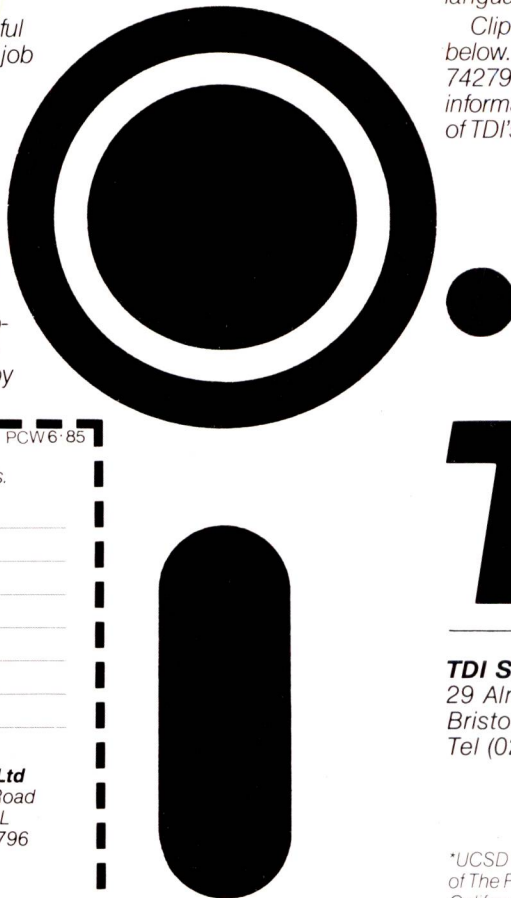
Start with the basics, UCSD Pascal, enhanced to allow you to include many of the Macintosh ROM routines, a complete set of development utilities, a full-screen full-function editor, file manager and advanced development toolkit.

Add another language, or two. Such as Fortran-77 or Basic. Our compilers generate compact code and are truly integrated into the development environment.

Edit with ease. When an error is detected, the editor may be invoked and is automatically positioned at the statement in error.

You can also write in smaller segments. This simplifies debugging and testing and lets you use common procedures in multiple applications. Even if they were written in one of our other languages.

Clip and post the coupon below. Or call us on 0272-742796. We'll send you information on the extensive list of TDI's products.



# TDI

**TDI Software Ltd**  
29 Alma Vale Road  
Bristol BS8 2HL  
Tel (0272) 742796

\*UCSD Pascal is a registered trademark of The Regents of the University of California.

Please send me information on UCSD Pascal on MacAdvantage and/or the P-System Designer Series.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Post Code \_\_\_\_\_

Telephone (       ) \_\_\_\_\_

Area of Activity:

- ☐ Software developer
- ☐ Retailer/dealer
- ☐ Education
- ☐ Other

**TDI Software Ltd**  
29 Alma Vale Road  
Bristol BS8 2HL  
Tel (0272) 742796

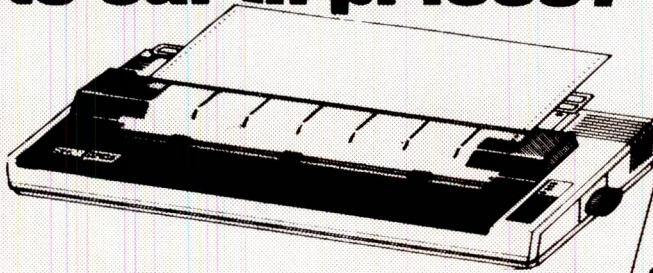
PCW 6/85



# DATA STAR QUALITY

## At down to earth prices.

When it comes to printers, whichever way you look at it, we've got the lowest prices, the widest range and the best back-up service in the country. What you won't get from us, are special gifts, or false promises — just honest value and a fully guaranteed after-sales service.



### SPECIAL OFFERS

**Brother — M1009** £173.86 + VAT = £199.95  
50cps • bi-directional • logic seeking • 96 chars plus international and graphics • 9 x 9 matrix.

**Gemini 10X** £189.95 + VAT = £218.44  
120 cps. • bi-directional • logic seeking • friction, tractor and roll holder standard • down loadable characters • ultra high resolution • 80 cols. • IBM PC version available.

**Canon PW 1080A** £265 + VAT = £304.75  
Near letter quality • 160 cps • bi-directional • 96 chars. plus graphics • 5 print sizes • 11 x 9 matrix • 23 x 18 NLQ matrix

### COMPLETE RANGE

#### DOT MATRIX

**Canon PW 1080A** £265 + VAT = £304.75  
**Epson RX80** £198.95 + VAT = £228.79  
**Epson RX80 F/T** £228.95 + VAT = £263.29  
**Epson FX80** £319.95 + VAT = £367.94  
**Canon PW 1156A** £359.95 + VAT = £413.94  
**Star Gemini 10x** £189.95 + VAT = £218.44  
**Star Delta 10** £319.95 + VAT = £367.94  
**Star Radix 10** £498.95 + VAT = £573.79

#### DAISYWHEEL PRINTERS

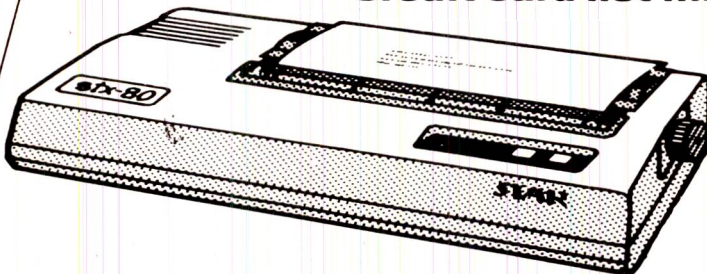
**Brother HR15** Ring for prices  
3k buffer • Subscripts & superscripts  
18CPS max • Proportional spacing  
Text reprinting • Two-colour printing  
Auto underlining  
RS232 or Centronics

**Juki 6100** £325 + VAT = £373.75  
20 CPS max • Bold & shadow printing  
Diablo protocols • Subscripts & superscripts  
Auto underlining  
Standard 2k buffer  
Wordstar compatible  
Comprehensive user-friendly manual  
1 year parts & labour warranty

**Cables • Paper • Ribbons • Sheet and tractor feeders • Interfaces**

If you have any technical queries or want our latest prices please telephone:

**Credit card hot line... 01-482 1711**



Please add £10 for delivery, we guarantee 48 hour delivery from payment. Personal callers welcome. We're at the junction of Camden Road, near the railway bridge. Anytime 9.00am to 6.00pm Monday to Friday 10.00am to 1.00pm Sunday. Export and dealer enquiries welcome. Post your order with cheque to

# Datastar Systems UK

Unicom House, 182 Royal College Street, London NW1 9NN  
Telex 295 931 Unicom G Telephone 01-482 1711





PALANTIR  
Word Processor



**PC USER NOV 83**

"Palantir looks to be one of the most powerful Word Processing packages on the Personal Computer"

**ACCOUNTANCY FEB 84**

"A truly friendly word processing and mailing system"

**PC MAGAZINE FEB 85**

"Yes, Tony Harrington could live with Palantir Software's word processing system"

A lot of people find it very difficult to believe the glowing reports that Palantir have been receiving. In a market that's so saturated with WP programs can any one product be so very superior?

*Well, the one word answer to that is 'Yes'. However, we don't expect you to take our word for it . . . we want you to prove it for yourself. We want you to put all our claims to the acid test.*

*Send away now for details of how you can obtain a FREE demonstration copy of our Palantir Software — especially configured for most micros.*

**NO BULL . . . NO GIMMICKS . . . NO GLIB SALES CLAIMS . . .** put Palantir through its paces and prove its superiority for yourself!



PALANTIR SOFTWARE,  
COLUMBIA HOUSE, 69 ALDWYCH,  
LONDON WC2B 4DX. TELEPHONE: 01-242 6284.



# EPROM PROGRAMMER

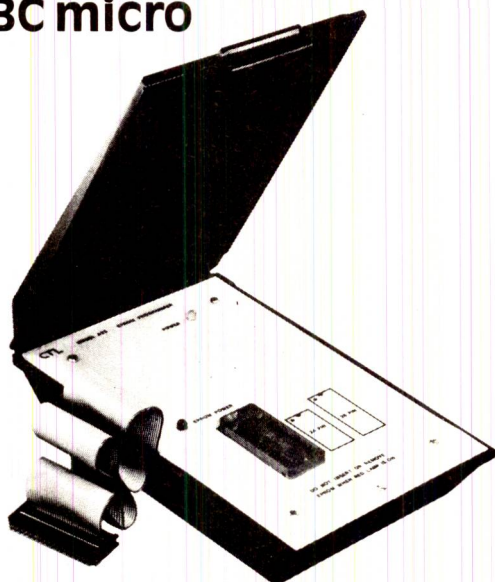
for the BBC micro

An exceptionally versatile unit, programs EEPROMs and EPROMs from 2K to 32K.

Powerful, easy to use software in a sideways ROM. Features full screen data editor, files, and softkeys.

Professionally designed hardware ensures reliable and safe programming, also detects badly socketed EPROMs.

Soundly constructed in a convenient flip-top box which protects unit when not in use. Supplied with a comprehensive manual.



**£95 (excl VAT, free P&P)**

2 year guarantee. Detailed information on request



Control Telemetry of London  
Unit 11, Burmarsh, Marsden St.,  
London NW5 3JA Tel: 01-482 2177

## SAVE UP TO £1000

on the price of an equivalent  
IBM PC system

### FERRANTI ADVANCE 86b

IBM compatible micro, 128K memory, 2 x 360K disk drives, colour graphics, parallel and serial ports, 5 expansion slots, complete with monitor, BASICA, integrated spreadsheet, wordprocessing, and database, and 12 months on-site maintenance.

**Only £1086 + VAT**

### COMPLETE BUSINESS PACKAGE

Ferranti Advance 86b micro, monitor, printer, accounts software, integrated spreadsheet, word processor, and database, BASICA, box of disks and paper, 12 months on-site maintenance. Everything needed to get you started.

**Only £1695 + VAT**

**UP TO 40% OFF PC SOFTWARE**

CALL NOW FOR DETAILS

OPEN 7 DAYS 9am to 9pm

### CARRERA COMPUTING

12 Lyons Avenue  
Hetton-le-Hole

Tyne and Wear DH5 0HS

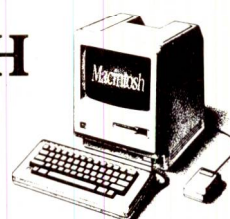
**Tel: SUNDERLAND (0783) 263251**

## MICRO COMPUTER CONSULTANTS LTD

OUR PRICES ARE VERY  
**COMPETITIVE**

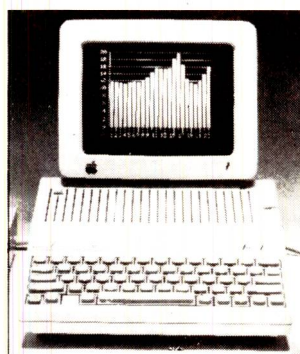
A Challenge to  
Every businessman

### MACINTOSH



**ALL the APPLE range  
at BARGAIN PRICES!**

PORTABLE Luxury with the



### APPLE IIC

- ★ Built-in disc drive
- ★ 128K RAM
- ★ 40/80 column display
- ★ TV Modulator
- ★ 6 interactive demo discs
- ★ Ultra Hi-Res
- ★ Built-in serial ports for printers and modem
- ★ Weight only 7.5lbs
- ★ External power supply



**Authorised Apple Dealer  
Level One Service Centre**

Call TODAY for further details



**Ascott House, 227 Elliott St  
Tyldesley, Manchester  
M29 8DG**

**Tel: 0942-892818**

☆☆☆OVERSEAS ORDERS A SPECIALITY☆☆☆



## APPLE COMPATIBLE PERIPHERALS

128k RAM Card with manual & disk	£139.95
SNAPSHOT (II & II+) — Dark Star	£52.00
SNAPSHOT II — Dark Star	£95.00
COPYKIT Software — Dark Star	£19.95
SHUTTLE MULTITASKING Software Dark Star	£19.95
Auto Dial Auto Answer MODEM Card	£125.00
COMMS software for above	£25.00
PRESTEL Graphics ROM for Modem Card	£19.95
Disk Drive Controller Card	£34.95
16K RAM (language) Card	£39.95
80 Column Card (4000 Compatible) II + e	£44.95
80 Col Card as above with Soft Control	£59.95
INVERSE Video ROM for above	£5.00
80 40 Column Hard Switch	£4.95
80 Column Card for file with 64K RAM	£84.95
80 Column Card for file with 64K RAM	£39.95
80 PLUS Card with Manual for II +	£169.95
CP/M 280-B (6MHz) Card with 64K RAM II +	£44.95
280 Card for file	£79.95
CP/M Module for file	£86.00
Parallel Printer Card (Centronics)	£34.95
Parallel Printer Card (Epson)	£34.95
SUPER Parallel Card with manual	£89.95
Printer Buffer Card (64K dump)	£129.95
Grappier + Card	£84.95
Grappier + 16K Buffer	£149.95
CHAMPION Parallel Interface (with cable)	£45.00
CHAMPION + 16K Buffer (with cable)	£89.00
CHAMPION + 64K Buffer (with cable)	£125.00
CACHEBOX 64K Parallel inline Buffer	£125.00
Communications Card	£32.95
RS-232 Serial Interface Card	£34.95
SUPER Serial Card with manual	£89.95
7710 Asynchronous Serial Interface	£79.95
NTSC to PAL Converter + UHF Mod	£44.95
RGB Card (TTL output)	£49.95
RGB Card (LINEAR output)	£49.95
IEEE-488 Controller, cable, disk & manual	£149.95
Epson Blower Card (2716, 2732, 2764)	£49.95
Mk2 Epson Blower (2716, 2732, 2764, 27128)	£59.95
NEW EPROM controller Parallel I/Face	£32.00
EPROM Blower for 16, 32, 64, 128, 256	£53.00
8 BIT AD DA Card (8-channel)	£59.95
12 BIT AD DA Card	£119.95
8 BIT 16 Channel AD Card	£59.95
8 BIT 16 Channel AD Da Card	£109.95
CLOCK CARD (TIME II) Card	£44.95
Music Card	£44.95
Wild Card	£69.95
Wild Card Plus	£99.95
Four Port Twin 6522 Card	£34.95
6809 Card	£119.95
Integar Basic Card	£32.95
CUMANA Drive for Apple	£145.00
ADF — 2 320KB Floppy drive	£249.00
ADF — 2 320KB Floppy drive	£249.00
ADF — 4 640KB floppy drive	£289.00
INTEC 5MB HARD DRIVE	£599.00
INTEC 10MB HARD DRIVE	£950.00
INTEC 10MB HARD DRIVE KIT	£875.00
(All INTEC drives are UK BUILT & BACKED — prices include controller card, cables, power supplies, utility & diagnostic software together with 24 MONTH service warranty)	
10MB HARD DRIVE CONTROLLER CARD (ST-506)	£250.00
LOGO Card	£59.95
Joystick (2 control buttons)	£9.95
Joystick (self centring)	£14.95
Joystick (deluxe version)	£19.95
Joystick extension cord	£3.99
Apple Compatible Power Supply 5A	£49.95
ASC II Encoded Keyboard with 1 c mod	£54.95
IBM STYLE keyboard for Apple	£89.95
A/C Cooling Fan (clip on) with suppress	£24.95
SpeEdh Card	£79.95
Replay Card	£79.95
Forth Card	£89.95
8088 Card with 64K (capacity 128K)	£365.00
Light Pen system	£195.00
Graphics Table	£89.00

## PRINTERS — DOT MATRIX

ANADEx — 100% DUTY CYCLE	
ALL MODELS	CALL
BROTHER	
HR-5 Portable thermal transfer (P or S)	£ 125
HR-5 for CMB64 VIC 20	£ 125
FP-44 Thermal transfer (KSR)	£ 189
M-1009 Dual Interface	£ 167
M-1009 (IBM) 50cps	£ 163
2024L NLQ 190cps draft	£ 889
TC 600 — Typewriter — printer	£ 365
DISK DRIVE for TC 600	£ 169
CANON	
PW-1080 160cps (NLQ)	£ 289
PW-1156 160cps (NLQ)	£ 349
F-60 80cps Thermal DRAFT NLQ LQ GR 110col	£ 389
PJ-1080A Seven COLOUR 37cps	£ 430
DATA PRODUCTS — PAPER TIGER	
8010 80col 180cps draft both S&P	£ 393
8011 as above but IBM COMPATIBLE	£ 393
8020 132col 180cps draft both S&P	£ 545
8021 as above but IBM COMPATIBLE	£ 545
8050 132COL 200CPS + SSF both S&P	£1242
8050 COLOUR as above but colour printing	£1469
8070 132col 400cps draft LO both P&S	£1619
8070 COLOUR as above but colour printing	£1859
EPSON	
RX-80 T 80col 100cps	£ 189
RX-80 F T 80col 100cps	£ 209
RX-80 136col F T 100cps	£ 324
FX-80 80col 160cps	£ 309
FX-100 F T 136col 160cps	£ 420
LQ-1500 200cps (NLQ) 4 to 16" paper width	£ 855
EPSON 8143 Serial interface 0K	£ 29
EPSON 8145 Serial interface 2K buffered	£ 59
EPSON 8148 Serial interface 3K buffered	£ 65
XON OFF Serial interface 2K buffer	£ 65
EPSON COMMODORE interface 2K buffer	£ 53
EPSON 8165 PET IEEE 2K interface 2K buffer	£ 65
EPSON PET IEEE Cable 8200	£ 20
EPSON APPLE Card 8132	£ 59
EPSON APPLE Cable 8231	£ 20
8K Buffered parallel or serial interface	£ 79
16K Buffered parallel or serial interface	£ 95
32K Buffered parallel or serial interface	£ 125
64K Buffered parallel or serial interface	£ 159
HONEYWELL	
ALL MODELS	CALL
MANNESSMANN TALLY	
MT-80 80cps	£ 189
MT-160 60cps	£ 395
MT-180 160cps (NLQ)	£ 545

# DAISY

## BUSINESS SYSTEMS LTD

56, MAPLE DRIVE, EAST GRINSTEAD, WEST SUSSEX, RH19 3UR

NEC	
PINWRITER P3 132col	£ 589
Parallel interface for P3	£ 99
RS232 interface for P3	£ 155
IBM PC interface for P3	£ 99
Sheet feeder for P3	£ 289
Tractor unit for P3	£ 119
NEWBURY DATA — Heavy Duty	
DRE-8925 parallel 240cps 132col	£1355
DRE-8850 parallel 300LPM	£2055
OKI — MICROLINE	
OKI-82A P & S 120cps 80col	£ 239
OKI-84A 200cps	£ 645
OKI-92P 160cps	£ 359
OKI-83A 120cps	£ 385
OKI-2410P 350cps	£1529
PANASONIC	
KX-P1091 120cps NLQ	£ 269
RADIX	
10 F T 200cps	£ 439
RITEMAN	
PLUS — (MX-80 FT compatible) 120cps 80col	£ 210
BLUE PLUS (RX-80 FT comp) 140cps 80col	£ 234
II — (FX-80 compatible) 160cps 80col NLQ	£ 250
15 — (FX-100 compatible) 160cps 136col	£ 399
SEIKOSHA	
GP-80 F T	£ 162
GP-100 VIC 50cps	£ 159
GP-100 Parallel or Serial	£ 159
GP-500A 50cps	£ 169
GP-250X 50cps	£ 199
STAR	
GEMINI 10X F T 120cps 80col	£ 195
DELTA 10X F T 160cps 80col	£ 295
RADIX 10 F T 200cps 80col	£ 399
GEMINI 15X F T 120cps 132col	£ 269
DELTA 15 F T 160cps 132col	£ 389
RADIX 15 F T 200cps 132col	£ 499
TAXAN	
KP-810 140cps 80col NLQ	£ 286
KP-810 140cps 156col NLQ	£ 368
TEC	
1550 Parallel	£ 450
1550 Serial	£ 489
TOSHIBA — 24 Wire Head	
2100H Parallel 100cps LQ	£1354
2100 Serial 100cps (NLQ)	£1289
2100G Parallel	£1426
2100G Serial	£1359
Auto Sheet Feeder for 2100	£ 546
Bi-directional Tractor for 2100	£ 136

## PRINTERS — DAISY WHEEL

BROTHER	
HR-15 Parallel 20cps	£ 319
HR-15 Serial 20cps	£ 349
HR-25 Parallel 25cps	£ 549
HR-25 Serial 25cps	£ 599
HR-35 Parallel 35cps	£ 729
HR-35 Serial	£ 779
HR-15 Keyboard	£ 129
HR-15 Sheet Feeder	£ 179
HR-15 Tractor Feed Unit	£ 60
HR-25-35 Sheet feeder	£ 185
HR-25-35 Tractor Unit	£ 75
**SPECIAL COMBI PRICE**	
HR-35 + SHEET FEEDER	£ 829
TOWA	
Daisy Junior 14cps 80col	£ 199
Daisystep 2000 18cps 132col	£ 219
DIABLO	
630-API 40cps	£1529
630-API Sheet Feeder	£ 375
EPSON	
DX-100 Parallel or Serial 20cps	£ 385
JIUJI	
6100 18cps	£ 315
6300	£ 645
2200	£ 249
2100	£ 169
NEC SPINWRITER	
3510 30 15 Ser P11 Diablo 35cps	£1035
7710 30 15 Ser P11 Diablo 55cps	£1429
5600 Printer 20cps	£ 569
Ser P11 Diablo I/Face for 2000	£ 89
8800 Printer	£1299
Ser P11 Diablo I/Face for 8800	£ 99
Accessories for NEC printers	CALL
QUME	
11 40 RO (without interface)	£1165
9 45 RO full front panel	£1525
12 20 Letter Pro (S or P) 20cps	£ 445
9 55 RO full front panel 55cps	£1895
11 55 RO (without interface)	£1359
QUEN DATA UCHIDA	
Daisy Wheel Parallel 18cps	£ 229
UCHIDA DAISY WHEEL 20cps parallel	£ 199
UCHIDA as above Serial version	£ 239
RICOH	
RP-1200 Parallel/Serial 20cps	£ 489
RP-1300S Parallel/Serial 30cps	£ 865
RP-1600S P11 or Ser 8K 60cps	£1300
FLOWWRITER 1600 48K Multi I/Face	£1235
FLOWWRITER 1300 48K multi I/Face	£1279
Elec Mech Sheet Feeder RP-1600	£ 445
Tractor Unit for 1600 Models	£ 129
SILVER-REED	
EXP-400 Parallel 10cps	£ 219
EXP-400 Serial 10cps	£ 249
EXP-500 Parallel 16cps	£ 259
EXP-500 Serial 16cps	£ 291
EXP-550 Parallel 19cps	£ 355
EXP-550 Serial 19cps	£ 449
EXP-770 Parallel 36cps	£ 649
EXP-770 Serial 36cps	£ 665
ASTRON (SILVER REED EXP770) P11	£ 599
Tractor for 500	£ 84
Tractor for 550/700	£ 105
Cut Sheet Feeder for 500	£ 163
Cut Sheet Feeder for 550/770	£ 153
8K Buffer for 770	£ 55
16K Buffer for 770	£ 95
48K Buffer for 770	£ 259
TEC STARWRITER	
F10 40 Parallel 40cps	£ 830
F10 55 Parallel 55cps	£1190
Elec Mech single Sheet Feeder	£ 445
Tractor for F10 units	£ 129

## MONITORS

SANYO	
DM-2112 40col 15MHz + P31	£ 63
DM-8112X 80col 18MHz + P31	£ 83
CD-3125 14" Normal Res RGB	£ 169
CD-3114 14" Medium Res RGB	£ 296
CD-3115 14" High Res RGB	£ 389
DMC 7650 IBM APRICOT Colour Monitor	£ 349
YAN JEN	
GN-1211 12" Green or Amber 20MHz with tilt & swivel base	£ 83
ZENITH	
122E 12" 15MHz Amber	£ 84
123E 12" 15MHz Green	£ 79
Ti base for above	£ 8
ZVM-133 13" Colour Hi Res (IBM-PC)	£ 329
Cable for ZVM-133 IBM-PC	£ 15
PHILIPS	
TP-200 12" 18MHz Green	£ 65
INDESIT	
APRICOT Display 12" (beige or black)	£ 159
PLOTTERS	
EPSON H180 Pletter	£ 349
ASTAR MCP-40 4-Colour 80 character	£ 105
ASTAR MCP-80 4-Colour full graphics	£ 165
**NEW** SILVER REED EB-50 typewriter/calculator intelligent 4-colour plotter	£ 199
COLOUR PRINTERS	
SEIKOSHA GP-700A	£ 345
EPSON JX-80 160cps Text	£ 469
DIABLO 150C	£ 799
ANADEx 12P-9725B	£1299
CPP-40 4-Colour printer/plotter	£ 99
HARD DRIVES & CONTROLLER PACKAGES — All CSI/RODIME inc cable/host controller manual & support disk. Available for IBM-PC, APRICOT, PC-COMPATIBLES, SANYO 550/555	
11MB WINCHESTER + CONTROLLER	£ 999
22MB WINCHESTER + CONTROLLER	£1259
33MB WINCHESTER + CONTROLLER	£1399
44MB WINCHESTER + CONTROLLER	£1599
HARD DRIVE + CONTROLLER + STREAMER — All CSI/RODIME/CIPHER supplied with cables, host controller, manuals & support disks. In versions for IBM-PC, APRICOT, PC-COMPATIBLES & SANYO	
11MB WINCHESTER CONTROLLER/STREAMER	£1749
22MB WINCHESTER CONTROLLER/STREAMER	£1999
33MB WINCHESTER CONTROLLER/STREAMER	£2159
44MB WINCHESTER CONTROLLER/STREAMER	£2399

## COMPUTERS

APRICOT	
F1	£ 910
PC 256K + 2 x 315K + Monitor	£1389
PC 256K + 2 x 720K + Monitor	£1529
XI 256K + 10MB + Monitor	£1289
SANYO	
MBC 550 128K + 1 x 160K + software	£ 595
MBC 555 128K + 2 x 160K + software	£ 789
MBC 550-2 as 550 but 360K drive	£ 789
MBC 555-2 as 555 but dual 360K dr	£1169
CRT 36 Hi Res 12" Green Monitor	£ 110
CRT 50 Med Res Colour Monitor	£ 279
CRT 70 Hi Res Colour Monitor	£ 419
MBC 232 — RS232 I/Face board	£ 49
64K RAM Plug In Module	£ 79
EPSON	
PX-8 Portable Computer	£ 669
120K RAM disk for above	£ 249
PX8 + 120K RAM disk	£ 889
QX-10 Desk Top Computer	£1569
ZENITH	
Z-150PC 2 x 320K + 128K RAM	£1545
Z-150PC with 10MB Hard Drive	£2799
Z-160PC Transportable 2 x 320K + 9" display	£1729
*** NEW CANON-IBM COMPATIBLE COMPUTER***	
A-200M 256K + 2 x 36K drives + mono display	
MS-DOS GW-Basic	£1449
A-200C as above but COLOUR DISPLAY	£1549
OLIVETTI M24	CALL
COMPAQ	CALL
COMMODORE	
PC 10 IBM COMPATIBLE	£1449
PC 20 IBM COMPATIBLE	£2439
SANYO	
SANYO MBC 775 COLOUR PORTABLE IBM COMPATIBLE	256K
RAM + 2 x 320K DRIVES AND COLOUR MONITOR	£1749

## DRIVES — MEGABYTES FOR MICROPOUNDS!

IBM COMPATIBLE ACCESSORIES	
PC 128K 2 x 320K Drives Colour Gr etc	£1599
Motherboard 8-slot 128K (256K)	£ 449
Multifunction Card 1ser/2pl/clock	£ 259
Monochrome adapter with printer port	£ 239
Multi I/O card 1ser 1pl 1game/2floppy	£ 299
64K RAM Extend Module	£ 59
TEAC 320K DS/DD Drives	£ 175
512K RAM EXPAND board (includes 128K)	£ 299
XEBEC Winchester controller	£ 425
10MB SHUGART HARD DRIVE	£ 815
Western Digital 1002 SWX-2 Hard Drv Contrl	£ 375
MR 521 10MB Hard Drive	£ 523
MR 522 22MB Hard Drive	£ 735
85-Key Compatible keyboard	£ 125
130 WATT SWITCHING Power Supply	£ 169
Floppy Driver Controller (2 Drives)	£ 109
Floppy Driver Controller (4 Drives)	£ 149
(S.A.E. for full list of all compatible boards)	

## SOFTWARE

WORDSTAR	£ 189
DBASE II	£ 229
FRIDAY	£ 129
FRAMEWORK	£ 315
LOTUS 123	£ 269
SYMPHONY	£ 380
DMS — DELTA	£ 369
MULTIMATE	£ 255
OPEN ACCESS	£ 310
DBASE III	£ 315
SUPERCALC II	£ 130
SUPERCALC III	£ 169
MULTIPLAN	£ 125
PEACHTREE ACCOUNTS	POA
PFS FILE	£ 75
PFS REPORT	£ 75
SIDEKICK	£ 42
CARD BOX PLUS	£ 285
CROSSTALK XVI	£ 120
WORDSTAR PROFESSIONAL	£ 245
SIDEWAYS	£ 49
WORDSTAR 2000	£ 289
FLIGHT SIMULATOR	£ 39
NORTON UTILITIES	£ 65
SPREADSHEET AUDITOR	£ 75

REMEMBER! Even if you don't see it advertised here, we can probably supply it, AND FOR LESS. Problems with limited space means that we are only able to advertise a limited range of products. Additional prices on application. Consumables, paper, ribbons etc, supplied at exceptional prices. 24-HOUR DELIVERY on items ex-stock.

CARRIAGE WITHIN UK: Items which may be dispatched by POST (eg, peripheral cards etc) add £2.00 per order for any order under £50.00. ORDERS EXCEEDING £50.00 CARRIAGE FREE. SOFTWARE PACKAGES: CHARGED SEPARATELY. MINIMUM CHARGE £4.00. Items which must move by CARRIER (such as printers, monitors etc), will be delivered within 24 hours for a charge of £10.00, OR ALTERNATIVELY within 48 HOURS at a charge of £7.50. Add 15% VAT to all prices given. Remember, VAT is also applicable on carriage at 15%. Terms STRICTLY CWO. DEALER ENQUIRIES WELCOME. FOREIGN enquiries if possible by telex please. Favourable rates to most destinations. CALLERS BY APPOINTMENT ONLY.



TEL: (



# CORPORATE BUYERS HAVE NO CHOICE!!!

**IBM PC** +10 MB **£2,500**  
+20 MB **£2,700**

INCLUDES 256K RAM, 1 x 320K D.D., SCREEN, KEYBOARD, DOS. 2.1

from Silicon Valley Products

## IBM PC UPGRADE OPTIONS

PC to 10MB from **£799**

PC to 20MB from **£999**

XT10MB to 20MB from **£699**

Internal  $\frac{1}{2}$  height tape back up **£799**

**INCLUDES ON SITE MAINTENANCE**  
for Silicon Valley hard disc Products



164 Grays Inn Road,  
London WC1.  
Tel: 01-833 3391  
Telex: 262005 SILVAL G



Prices exclude VAT and are subject to change without Notice



# EXPORT

## AND OVERSEAS VISITORS

ALL MAKES OF MICRO  
COMPUTERS, PRINTERS,  
PERIPHERALS AND SOFTWARE  
SUPPLIED AT DISCOUNT  
PRICES.

**AMSTRAD • ORIC • SINCLAIR**  
**• BBC MICRO • ELECTRON •**  
**COMMODORE**  
**EPSON • BROTHER AND ALL**  
**POPULAR MAKES.**

# MICROGOLD

**UNICOM HOUSE**  
**182 ROYAL COLLEGE STREET,**  
**LONDON NW1 9NN**  
**TELEX: 295931 UNICOM G**  
**TELEPHONE: 01-482 1711**

## Looking for the best dBASE® offer available



includes, ABSOLUTELY FREE,  
the SYBEX BOOK  
"Understanding dBASE II"

Cash / Cheque with Order

### OTHER SOFTWARE AVAILABLE

dUtil	£69	Friday	£175	Rescue III	£375
Expressbase II	£119	Compsoft DMS+	£195	dBase III (IBM PC)	£399
dGraph	£179	Autocode	£199	Retrieve II	£375
Quickcode	£179	dB/Compiler	£695	Delta IV.....	£495

— — — Please add VAT to the above prices which include carriage — — —  
stating Computer type and Format required.

### BOOKS

Advanced dBase II Users Guide	£33.35	Everyman's Database Primer II	£16.50
Advanced Techniques in dBase II	£20.95	Everyman's Database Primer III	£16.50
DELTA, Data & You	£10.95	The Illustrated dBase II Book	£19.50
dBase II for Every Business	£16.50	Mastering dBase II Easy Way	£17.20
dBase II for First Time User	£16.95	Understanding dBase II ●	£18.95
dBase II Guide for Small Business	£20.95	Understanding dBase III	£20.95

E & O Please add 1.90 for single books towards packing & post  
(plus 0.60 for each additional book)

### MAIL ORDER ONLY

Send for latest Price List stating type of Computer & specific interests.



**PARKINS**  
**ASSOCIATES**

**PARKINS ASSOCIATES (PCW 6)**  
**20 RIDGEWAY, RAYLEIGH**  
**ESSEX SS6 7BJ**

Tel: 0268 - 743928

Cash / Cheque  
with order  
or Access



Prices as at 18/4/85





## AMERICAN & BRITISH COMPUTER BOOKS & MAGAZINES

We offer a World-Wide service for books from all publishers and more than 50 magazines.

Please fill in the coupon and ask for monthly listing of NEW books and magazines. You may also subscribe to the following popular magazines starting from the current issues.

	Europe	Other
AMSTRAD CPC 464 USER	£19	£27
BYTE	£26	£32
COMMODORE USER	£18	£28
MSX COMPUTING	£18	£28
MSX USER	£18	£28
PERSONAL COMPUTER WORLD	£19	£28
OL USER	£18	£28
SINCLAIR PROGRAMS	£18	£28
SINCLAIR USER	£19	£29
YOUR COMPUTER	£21	£32

These are SPECIAL 6 months Trial Offer Prices.

Please fill the coupon and send it with your cheque to:

### COMPUTER BOOKS AND MAGAZINES — HAULSTERM LTD

91 Exeter House, Putney Heath, London SW15  
Tel: 01-788 8746

Name..... Tel:.....

Address.....

I wish to subscribe for 6 months to the following magazines:

1..... £.....

2..... £.....

3..... £.....

Enclosed please find a cheque for Total £.....

Please send me list of books and other magazines.

## Word-Bird

is not “user friendly” it is *easy* and *natural* to use.

No commands, no keying-in sequences, no “easy” reference cards.

*Can be used immediately, mastered in days.*

Labels, letters and fully-formatted books are typed direct to the screen, as they will look on paper, with all the emphasis and special characters your printer is capable of.

Easy, natural multi-lingual use.

Full wordprocessing power at your fingertips.

*Phone for your FREE copy of the Word-Bird Book of Wordprocessing now!*

114 Brandon Street

London SE17 1AL

Telephone: 01-708 2756

## LEABUS

Legal & Business  
Software

# TO GET A LITTLE RUFFLED PRINTOUTS

There are thousands of Mr Fotheringtons throughout Britain who have to wait unnecessarily long for hard copy.

If only they had access to more satellite printers.

If only they could get their hands on Star's new SR-15. A dot matrix printer that not only sets new standards in value and reliability, it offers exceptional print quality.

Compare the features for yourself:-

☐ New NLQ font produces characters of near daisy wheel quality yet still offers 200 cps in draft mode from a 9 wire print head.

☐ Compatible with IBM PC's and other micros at a touch of a switch.

☐ 132 column width with automatic single sheet paper set and integrated tractor feed.

☐ Wide range of character sets and fonts.

International characters, italics and proportional spacing can be selected on all modes.

☐ Exceptional value at £589.

Fill in the coupon for full details and see what made us one of the leading ranges of computer printers in the USA in only two years.



Please send me details of your Comprehensive range of Star Computer Printers.

Name..... Position.....

Company.....

Address.....

**star**

Star Micronics U.K. Ltd.,  
Craven House, 40 Uxbridge Road, London W5

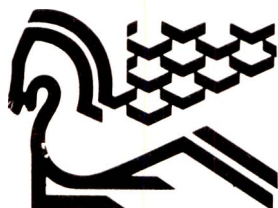
WHEN WILL YOU BECOME A STAR WITH ONE OF OUR PRINTERS?

PCW. 6.85



# \*\*\* CUT PRICE MICROS \*\*\*

P  
L  
U  
S



**PEGASUS  
BUSINESS  
SOFTWARE**

## APRICOT MICROCOMPUTERS

ACT Xi 10 MEG £(VERY LOW!!)  
ACT Xi 5 MEG £(EVEN LOWER!!)  
ACT 2x720K £(LOWER THAN MAYFAIR)  
ACT 2x315K £(LOW-LO-LO)  
12" MONITORS AVAILABLE

## THE PEGASUS SYSTEMS

### SYSTEM 1

APRICOT WITH 2 x 720K PLUS 12" MONITOR  
PLUS SUPERWRITER WORDPROCESSING PROGRAM  
PLUS SUPERCALC FINANCIAL FORECASTING PROGRAM  
PLUS SUPERPLANNER ELECTRONIC DIARY AND  
CARDBOX SYSTEM

PLUS PEGASUS SALES ORDER PROCESSING/INVOICING  
PLUS PEGASUS SALES LEDGER  
PLUS PEGASUS PURCHASE LEDGER  
PLUS PEGASUS NOMINAL LEDGER

PLUS DATA CABLE TO LINK PRINTER TO COMPUTER  
PLUS 20 3.5" DISKS  
PLUS BROTHER HR15 DAISY WHEEL QUALITY PRINTER  
**SYSTEM PRICE £2796.00**

### SYSTEM 2

APRICOT WITH 10 MEGABYTE HARD DISK DRIVE AND  
12" MONITOR  
WITH SUPERWRITER FOR WORD PROCESSING  
WITH SUPERCALC FINANCIAL FORECASTING  
SPREADSHEET  
WITH SUPERPLANNER ELECTRONIC DIARY SYSTEM

PLUS EPSON FX80 PRINTER  
PLUS DATA CABLE TO LINK PRINTER TO COMPUTER  
PLUS 10 3.5" DISKS  
PLUS 1 BOX OF FANFOLD PAPER

PLUS ANY 4 MODULES OF PEGASUS ACCOUNTING  
SOFTWARE

**SYSTEM PRICE £3596.00**

WE CAN  
RECONFIGURE ANY  
PACKAGE TO SUIT  
YOUR INDIVIDUAL  
NEEDS. WE PROVIDE  
HOT-LINE SUPPORT,  
SERVICE, DATA  
INSURANCE & ON-  
SITE MAINTENANCE

## THE APRICOT SYSTEMS

APRICOT Xi 10 MEG  
SUPERWRITER  
SUPERCALC  
SUPER PLANNER  
BASIC/MS-DOS/CPM-86  
FX100 PRINTER & CABLE  
BOX OF DISKS  
BOX OF PAPER  
£2800

APRICOT 2x720  
12" MONITOR  
SUPERWRITER  
SUPERCALC  
SUPER PLANNER  
ANY PRINTER  
WORTH UP TO £400  
  
£1996

## SOFTWARE – UP TO 30% DISCOUNTS

WORDSTAR  
FRIDAY  
DBASE II  
OPEN ACCESS

SYMPHONY  
TOUCH & GO TYPING TUTOR  
SUPERCALC III

CARDBOX  
DBASE III  
AUTOCODE  
LOTUS 1-2-3

SUPERCALC II  
MULTIPLAN  
FRAMEWORK

OUR FULL SOFTWARE RANGE IS FAR TOO LARGE TO INCLUDE HERE PLEASE  
CALL US FOR CURRENT PRICES ON ANY SOFTWARE PRODUCT

ALL ITEMS ARE FULLY SUPPORTED AND GUARANTEED. CALL NOW FOR FREE  
ADVICE FROM OUR APPLICATIONS EXPERT. TRAINING IS ALSO AVAILABLE ON  
ANY PROGRAM OR COMPUTER.

WE OFFER FREE TRAINING WITH ANY TOTAL PEGASUS SYSTEM BOUGHT  
FROM US. OUR SYSTEMS ARE SOLD ON AN INSTALLED AND WORKING BASIS.  
WE CAN DELIVER TO ANY PART OF THE U.K. OR COURIER TO ANY TRADING  
COUNTRY IN THE WORLD.  
VAT NOT INCLUDED IN ABOVE PRICES.

**BUY RENT OR LEASE  
FROM THE PROFESSIONALS**



*We are authorised dealers for the above*

**TEL: 01-800 8182**  
**78-82 KIRKTON ROAD**  
**LONDON N15**

**MCS**



**AVAILABLE  
SOON**

## COMMODORE PC (256K6 RAM)

### SPECIFICATION

Compatibility	IBM PC & XT		
Microprocessor	Intel 8088 16-bit processor Intel 8087 Floating Point Processor (optional)		
Clock Speed	4.77 Mhz		
Memory	Main 256K RAM (expandable to 640K) Video 32K RAM ROM 8K or 16K		
Display	12" monochrome CRT (green phosphor) Screen formats: Monochrome alphanumeric 80 × 25 Monochrome graphic 640 × 200 pixels Monochrome graphic 640 × 352 pixels Alphanumeric attributes: High intensity, reverse video, blinking Underlining (monochrome only)		
Keyboard	Detachable 84 keys, including 10 function keys		
Interfaces	Parallel port — Centronics Serial port — RS232 Composite monochrome Five expansion slots (for PC compatible PCBs) Power	Keyboard RGBI	
Storage	Dual double-sided floppy disk drives capacity 360K each, or One floppy & one 10 Mbyte hard disk		
Operating system	MS/DOS		
Language	GW Basic		



**£1675  
+ VAT**

**ON SALE IN OUR  
SHOWROOM — MID APRIL**

### OTHER EQUIPMENT

Brand	Model	Price (exc VAT)
Brother	EP44 (one only)	£210.00
Commodore	8296D	£1675.00
Datasc	1000	£1050.00
dBase	For Apricot PC XI (one only)	£250.00
Epson	PX-8 (one only)	£750.00
Facit	451Z	£630.00
Mannesmann	MT-80+	£180.00
Multitech	MPF-PC 512	£1730.00
NEC	8201	£299.00
Olivetti	M24	See Below
Panther	DX109	£269.00
Philips	P3100	£1630.00
Sanyo	775	£2150.00
Qume	QUT102A	£613.00
Zenith	Z150PC	£1775.00

## NEWTRENDS TECHNOLOGY MAY/JUNE SPECIALS

### PHILIPS MONITORS



#### ZENITH MONITORS

ZVM 124: AMBER  
(IBM COMPATIBLE)  
ZVM 123: GREEN  
ZVM 133: COLOUR

£ 85.00  
£ 85.00  
£350.00

TP200: 12" Green .....£72.50  
7502: 12" Hi-Res Green.....£72.50  
7522: 12" Hi-Res Amber .....£78.25  
7513: 12" IBM Green .....£90.75  
CT2007: RF. CUBS, RGB,  
all-in-one, colour monitor and  
normal television reception  
£216.25

**Apricot Xi 10** 256 RM, 10Mb  
Winchester, 9" monitor (hi res),  
STD software package including  
MS DOS 2.0 GSX graphics,  
microsoft basic interpreter,  
configurator, utilities, asynch  
comms, super calc, super planner  
and superwriter and dot matrix  
printer.

**Sanyo 775**, 2 × 360 disk drives,  
256 Kb RAM, colour portable, IBM  
PC keyboard, Wordstar, Calc  
Star, MS DOS 211 Z expansion  
slots accepts all ML APL IBM  
cards.



**£2150 + VAT**

**Sanyo 555**, 2 × 169K drives,  
128K RAM, Calc Star, MS DOS,  
Basic, Wordstar/Mailmerge,  
Infostar, CRT-36 Monitor, MT-80  
dot matrix printer and cables

**£1175  
+ VAT**

For  
Daisywheel  
add  
£103



### OLIVETTI M24 128K (Fully IBM Compatible)

Including 12" monitor, keyboard, MS DOS, 2 × 320 disk drives, MT 80+, cables,  
10 disks, IBX paper, dBase III, 128K memory board, over £2550 worth of  
equipment and software.

**ONLY £2275.00**

#### WE ALSO CARRY:

Quen-Data • Yan Jen • Fujitsu • Anadex • Toshiba • Cumana • Seikosha •  
CSI • Rodime • Firefly • Dacom • DEC • Ricoh • NEC • TEC • Silver Reed •  
Diablo • Smith Corona • IDS • Panasonic • Viking • Oki • Newbury • Kokasi •  
Hazeltine • Star • Admate • SMC • Case • ABS • Ceedata • Freedom •  
Zebra • Graftel • Ferret • CES • Ampex • Triumph Adler • C-Itoh • Realtime •  
Juki • Fame • Falco • Citizen • D-Base • Symphony • Sage • Q Pro 4 •

### DEALERS FOR ABS-ORB TRUE MULTI-USER SYSTEMS

Designed & manufactured in Britain.  
iApx 186 16 Bit Micro Processor. 256K. 12" Screen.  
8 Serial ports. 2 Floppy disk ports. Up to 4 hard disk drives.  
Unidirectional 8 bit buffered TTL output port.



**TRAINING CAN BE PROVIDED — 1 YEAR WARRANTY & MAINTENANCE  
CONTRACTS AVAILABLE ON ALL SYSTEMS SUPPLIED**

## NEWTRENDS TECHNOLOGY

### SOUTHBANK HOUSE

**BLACK PRINCE ROAD, LONDON SE1 7SJ**

**Tel: 01-735 8171/582 9566 Telex: 295555**

For more information on price and availability write to Newtrends New Products  
Division, Southbank House, Black Prince Road, London SE1 7SJ.

All prices exclude VAT and carriage. Add £3.00 parcel post. £8.00 special delivery. Make cheques/POs payable to:

**NEWTRENDS TECHNOLOGY SOUTHBANK HOUSE BLACKPRINCE ROAD, LONDON SE1 78J Tel: 01-735 8171/01-582 9566**



# MicroSight



## MicroSight I on the BBC model B includes:—

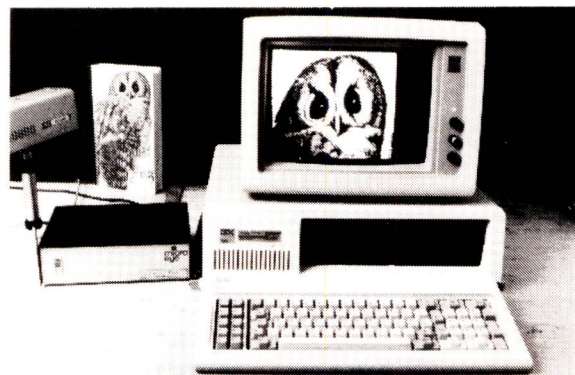
- A CCTV camera with lens and tripod.
- MicroEye vision interface 256 x 300 resolution with 8 bit video plus all cables.
- Fully documented hardware and software.
- MicroSight software package with area perimeter routines as well as disk and printer dumps.
- Hi Res software package with mode O display, disk and printer dumps and thresholding.
- Package using mode 2 high quality display.

## MicroScale

An image processing package with editing area and perimeter calculations, dimensioning, windowing, threshold and contrast setting.

## MicroEye

Vision interface 256 x 300 resolution 256 grey levels with full documentation and software for BBC Sirius, IBM, Apple, RML, CBM etc.



## MicroScale II

Image analysis for the IBM PC with:—

- Object area measurement (absolute and %)
- Perimeter measurement to user defined scaling
- User definable and standard windows.
- Disk and printer dumps.
- Dimensioning and object counting.
- Fully documented C software.

Also available for Hewlett Packard and Sirius.

For further details contact:—

**DIGITHURST** The image analysis people

Digithurst Ltd.  
Leaden Hill, Orwell, Royston,  
Herts. SG8 5QH Telephone (0223) 208926

# SOFTSEL®

**It's available from your local Softsel dealer.**

ADELPHI BUSINESS COMPUTERS LTD.  
25 TRINITY STREET, COVENTRY,  
WEST MIDLANDS CV1 1FJ. TEL: (0203) 553944.

ADVANCED MICRO PRODUCTS  
200 COURT ROAD, ELTHAM,  
LONDON SE9 4EW. TEL: (01) 851 3311.

COLIN GRACE ASSOCIATES LTD.  
CLIFTON MEWS, 62 HIGH STREET,  
SAFFRON WALDEN, ESSEX CB10 1EE.  
TEL: (0799) 22532.

COMPUTER CITY  
78 VICTORIA ROAD, WIDNES,  
CHESHIRE WA8 7RA. TEL: (051) 420 3333.

DEVERILL COMPUTER SERVICES LTD.  
ITEC HOUSE, 34-40 WEST STREET,  
POOLE, DORSET BH15 1LA. TEL: (0202) 684441.

FAIRHURST INSTRUMENTS LTD.  
WOODFORD ROAD, WILMSLOW  
CHESHIRE SK9 2L. TEL: (062) 5533741.

GATE MICROSYSTEMS LTD.  
ABBAY HOUSE, 10 BOTHWELL STREET,  
GLASGOW, STRATHCLYDE G2 6NU.  
TEL: (041) 221 9372.

MBS DATA EFFICIENCY,  
MAXTED ROAD, HEMEL HEMPSTEAD,  
HERTS HP2 7EL. TEL: (0442) 60155.

PACE SOFTWARE SUPPLIES  
92 NEW CROSS STREET, BRADFORD,  
W. YORKS. TEL: (0274) 729306.

PERSONAL COMPUTERS LTD.  
220-226 BISHOPSGATE,  
LONDON EC2M 4JS. TEL: (01) 377 1200.

PROGRAMS UNLIMITED  
19 IMPERIAL HOUSE, KINGSWAY,  
LONDON WC1. TEL: (01) 240 9006.

RAVEN COMPUTERS  
28-32 CHEAPSIDE, BRADFORD,  
YORKS BD1 4JA. TEL: (0274) 309386.

STIRLING MICROSYSTEMS,  
1 PARK ROAD,  
LONDON NW1 6XE. TEL: (01) 486 7671.

TASHA BUSINESS SYSTEMS  
191 KENSINGTON HIGH STREET,  
LONDON W8. TEL: (01) 937 7896.

THAMES VALLEY SYSTEMS  
GREYS HOUSE, 7 GREYFRIARS ROAD,  
READING, BERKS RG1 1NU. TEL: (0734) 581829.

UNITED SUMLOCK LTD.  
36 KING STREET, BRISTOL,  
AVON BS1 4DZ. TEL: (0272) 276685.

*MusicWorks*™  
**HAYDEN**  
SOFTWARE





# Make it big with Musicworks.<sup>TM</sup>

They had everything going for them. Good looks, determination and a great image.

But one thing stood between the Sydney Saunders Skiffle Duo and success in the music business. Talent.

But blessed with a good ear for a winner, Sydney laid out a few notes for Musicworks. A major development from Hayden Software.

## FOR BUDDING HOLLIES EVERYWHERE

Even if you can't read a note, Musicworks enables you to compose music directly on your Apple Macintosh,<sup>TM</sup> and hear the results instantly.

You compose on a seven-and-a-half octave grid. Just like the keys on a piano. As you put down your notes you hear them. All in the click of a mouse.

When you've got your latest masterpiece sounding just right, Musicworks transforms it into a musical staff, inserts the right

notation and prints it in a professional format which any musician

can follow. Even Sydney.

Now he can drum up any tune he likes. Change and edit notes. And then play back the whole melody whenever he wants.

## THE FAB FOUR

Another feature that Sydney likes to harp on about is Musicworks' built-in instrument selection.

Use up to four at a time from a total of 10 or listen to each one selectively. Musicworks also comes complete with templates which guide you through playing classical and popular selections.

It's available from your local Softsel dealer. Along with over 2,600 other titles from over 250 publishers.

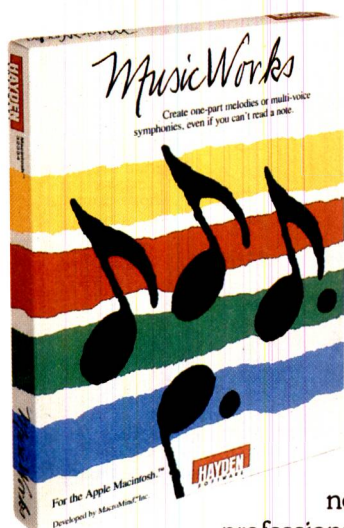
However there's still one slight hitch in Sydney's rise to stardom. He's been charged under the Trade Descriptions Act over the name of his latest album – "Sydney Saunders Entertains".

Musicworks – A sound investment.

**SOFTSEL<sup>®</sup>**

**The number one distributor of software.  
In the world.**

Softsel Computer Products Ltd, Softsel House, Syon Gate Way,  
Great West Road, Brentford, Middlesex TW8 9DD.





## 2c SYSTEM 2

Apple 2c	£899 + VAT
2c Monitor	£129 + VAT
Monitor Stand	£27 + VAT
Apple Works	£175 + VAT

**SYSTEM PRICE** £1049 + VAT

## 2c SYSTEM 3

Apple 2c	£899 + VAT
2c Monitor	£129 + VAT
Monitor Stand	£27 + VAT
Additional	
Disk Drive	£199 + VAT
Apple Works	£175 + VAT

**SYSTEM PRICE** £1199 + VAT



APPLE 2c



- 128K RAM
- Built-in Disk Drive
- 80 Column Display

APPLE 2e



- Reliable
- Flexible
- Well Proven

## 2e SYSTEM 2

Apple 2e	£489 + VAT
Disk with Controller	£199 + VAT
Additional Drive	£149 + VAT
12" Monitor	£79 + VAT
Apple Works	£175 + VAT

**SYSTEM PRICE** £999 + VAT

## 2e SYSTEM 4

Apple 2e	£489 + VAT
Disk with Controller	£199 + VAT
Additional Disk	£149 + VAT
12" Monitor	£79 + VAT
80 Column Card	£79 + VAT
Printer Interface	£79 + VAT
Epson RX80FT	£259 + VAT

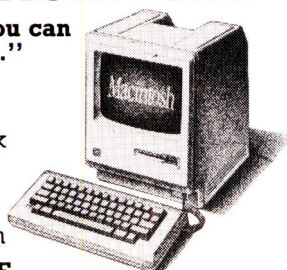
**SYSTEM PRICE** £1199 + VAT

## APPLE MACINTOSH

"If you can point, you can use a Macintosh."

- 68000 Processor
- 128K RAM
- Built-in 400K Disk
- Macwrite
- Macpaint
- Built-in high resolution screen

Macintosh with **FREE** Imagewriter **OR** External Drive **£1790 + VAT**

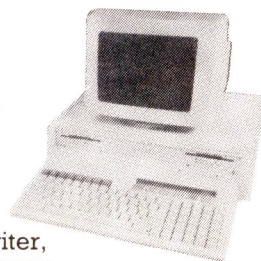


## ACT APRICOT

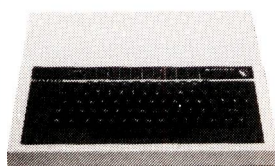
Apricot PC  
from **£1490 + VAT**  
including Monitor

Apricot Xi  
from **£2490 + VAT**  
including Monitor

All Apricots come with BASIC Superwriter, Supercalc, Superplanner.



## ACORN BBC



BBC + 8 Program Tapes **£299 + VAT**

BBC + DFS + 8 Tapes **£349 + VAT**

**SYSTEM 1**  
BBC + DFS  
+ Disk Drive  
**£449 + VAT**

**SYSTEM 2**  
BBC + DFS  
+ Disk Drive  
+ High Res. Monitor  
+ Wordwise  
**£549 + VAT**

**SYSTEM 3**  
BBC + DFS  
+ Disk Drive  
+ Monitor  
+ Wordwise  
+ Epson Printer  
+ Box Diskettes  
+ All Leads  
**£799 + VAT**

**SYSTEM 4**  
BBC + DFS  
+ Disk Drive  
+ Monitor  
+ Wordwise  
+ Juki 6100 Daisy Wheel Printer  
+ Box Diskettes  
+ All Leads  
**£899 + VAT**

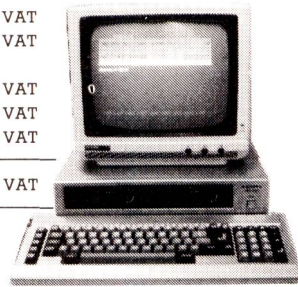
Maintenance Contracts available on BBC equipment. Phone for details.

## SANYO

MBC 555	£799 + VAT
12" Monitor	£79 + VAT
Juki 6100 Printer	£349 + VAT
Box Diskettes	£20 + VAT
Lead	£20 + VAT

**PACKAGE** **£1199 + VAT**

+ FREE Wordstar, Calcstar, Datastar, Mailmerge, BASIC



**COMP SHOP PRICE PROMISE**  
— We guarantee to match the price on equipment offered from stock through any other supplier.

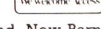
Educational enquiries and orders welcome. Quotations given.

One year warranty on all products.

COMP SHOP was established in 1978 and has continually offered the best in micro computers to discerning customers.

We sell only computers and peripherals, and therefore can offer the support many other shops cannot.

All prices quoted are exclusive of VAT.

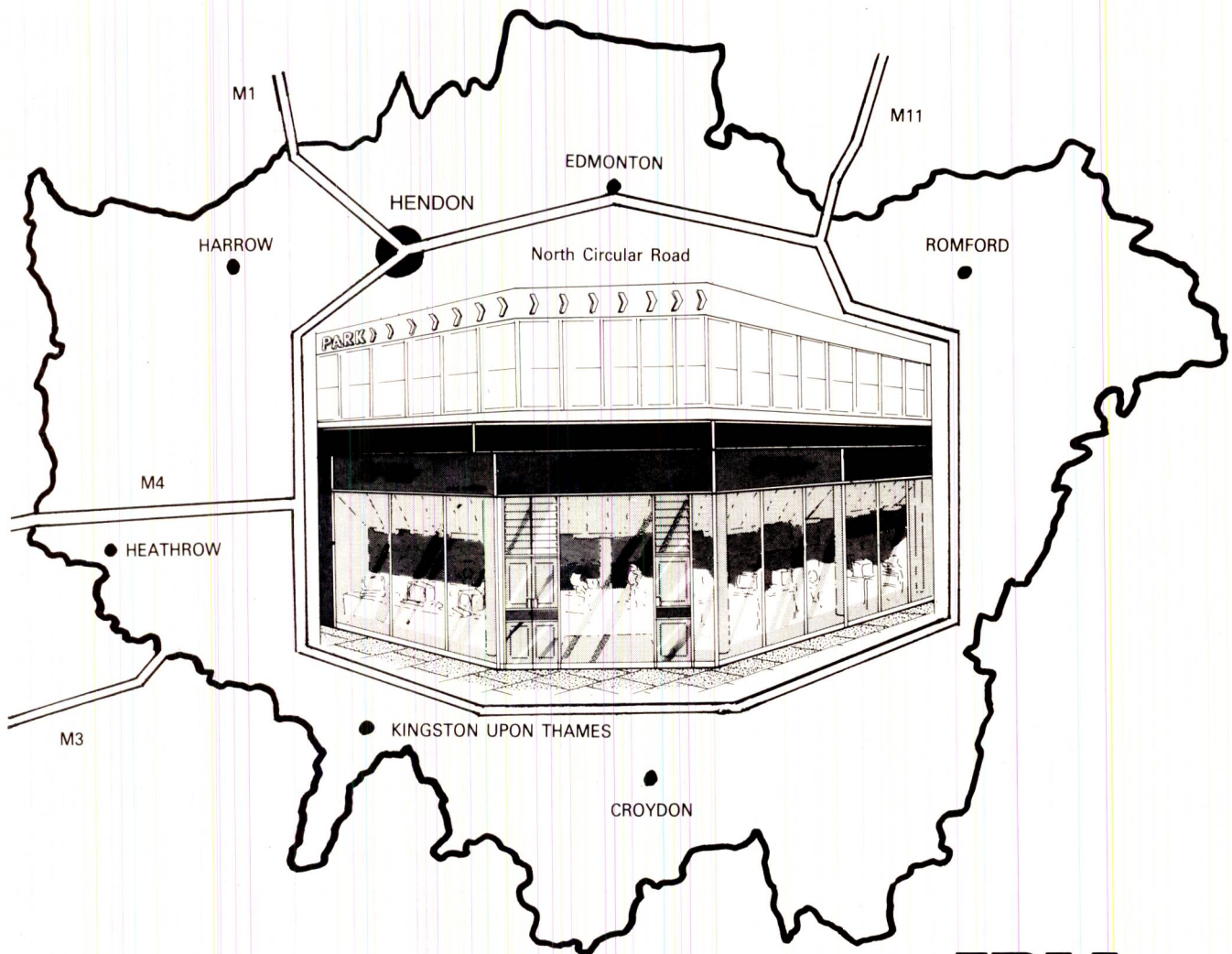


14 Station Road, New Barnet, Hertfordshire, EN5 1QW  
(Close to New Barnet BR Station - Moorgate Line)  
Telephone: 01-441 2922 (Sales) 01-449 6596 Telex: 298755 TELCOM G  
OPEN (BARNET) - 10am - 7pm - Monday to Saturday



# CAP IT ALL

WITH  
Da Vinci of London



If you look at what is offered by other dealers, you'll find that Da Vinci "Cap It All" around London.

Established for over 6 years in the field of microcomputer sales we have a solid base. Our superb showroom - office - workshop complex is probably the best custom built facility currently available and essential for authorised dealers of all market leaders.

An enquiry to our company, will result in prompt attention from one of our knowledgeable sales executives, and demonstrations can be carried out at either your HQ or ours.

Although not a "warehouse", we know you will find our quotations acceptable, and whether a first - time or repeat purchaser, our advice with regard to hardware and software selection, will always be based upon your individual requirements.

Installation and training can be scheduled precisely, so that your system is up and working for you with the minimum of delay.

You'll find our expert maintenance division provides the back-up essential to successful continuity with a short-period call-out contract available, as well as stocks of parts and peripherals and repair service.

If all this sounds too good to be true, we would just like to mention accessibility; 2 minutes from the M1, A1, North Circular Road, A41, nearest Tube station or Brent Cross (drop the wife off); 15 minutes from the M25, 25 minutes from Central London, 40 minutes from Heathrow and an hour or so from the Midlands. We have easy Free car parking to the rear and are open Saturdays as well as weekdays.

We think you'll agree, - DA VINCI CAP IT ALL.

**IBM**

PERSONAL COMPUTERS

**apricot**



PERSONAL COMPUTERS

**WORDCRAFT**



**PEGASUS  
BUSINESS  
SOFTWARE**



**Da Vinci  
Computer  
Store**

112 BRENT STREET HENDON NW4 Tel: 01-202 2272/3/4  
Telex: 265871 (MONREF G) REFER TO 81 MMD102  
TELECOM GOLD 81: MMD 102



## BBC MICRO COMPUTER SYSTEM

### BBC Computers

Model B	£299 (a)	6502 Second Processor	£175 (a)
Model B + NFS	£335 (a)	Acorn IEEE Interface	£280 (a)
Model B + DFS	£346 (a)	Z80 2nd Proc. + Software	£348 (a)
Model B + DFS + NFS	£399 (a)	Bitstick + graphics Software	£325 (a)

### TORCH UNICORN PRODUCTS:

ZEP100 Z80 Card with 64K Ram + Free Software Package	£275 (a)
ZDP240 Z80 Card with 2 x 400K Dual Drive + Software	£625 (a)
HDP68K + UNIX 68000 with Z80B & UNIX OS	£3495 (a)
GS800 GRADUATE 8086 + 256K RAM + Dual Drive + Xchange Software	£945 (a)

In addition to above we carry a very wide range of BBC firmware & software packages. Please write for further details.

## SANYO COMPUTER SYSTEM

SANYO's MBC 555 Series featuring 16 bit 8088 CPU with powerful MS-DOS operating system. 256K on board ram with a dual drive system offering 360K or 720K storage capacity. Detachable keyboard with 81 keys including 5 user definable function keys. RGB Composite Video with hi res 640 x 200 8 colour display. Centronics port as standard. Supplied with Systems discs, Sanyo BASIC and utility software which includes Professional WORDStar, DATAStar, SUPERSORT and CALCStar.

SANYO MBC 555-2 360K Drive	£1099 (a+b)
SANYO MBC 555-2 720K Drive	£1199 (a+b)

FREE SANYO Hi Res GREEN SCREEN MONITOR WITH THE COMPUTER

## PRINTERS

### EPSON

RX80T	£210(a)	RX80FT	£220(a)	RX100	£345(a)	FX80	£315(a)	FX100	£430(a)
-------	---------	--------	---------	-------	---------	------	---------	-------	---------

JX80 Full Colour Printer £525(a) H180 Plotter £399(a)

KAGA TAXAN NLQ Printers  
KP810 £225(a) KP910 £349(a)

### DAISY WHEELS

JUKI 6100 £325(a) BROTHER HR15 £325(a)

## PRINTER ACCESSORIES

### EPSON

Serial Interface: 8143 £28(b);  
8148 with 2K buffer £59(b).  
32K Parallel Buffer £99(b)

Paper Roll Holder £17(b);  
FX80 tractor Attachment £37(b)  
Ribbons: MX/RX/FX 80 £5(c);  
MX/RX/FX 100 £10(c).  
Dust Covers: RX/FX 80 £4.50(c);  
RX/FX 100 £6.50(c).  
KAGA Serial I/Face with 2K Buffer £65(c)  
Ribbon £6(c)

JUKI Serial I/Face with 2K Buffer £60(b);  
Ribbon £2.50(d).  
JUKI Sheet Feeder £180(a);  
Tractor Feed £129(a).  
BROTHER HR15 Sheet Feeder £199(a);  
Tractor Feed £99(a).  
2000 Fanfold sheets with extra fine  
performances  
9.5" x 11" £13.50(b); 14.5" x 11" £17.50(b).  
Self Adhesive Labels 3 1/2" per 1000.  
Single Row £5.25(d); Triple Row £5(d).  
Parallel Leads: IBM £18(c); BBC £7(c).

## TECHNOLINE VIEWDATA SYSTEM

Using 'Prestel' type protocols

For information and orders phone:  
01-450 9764.

24 hour service, 7 days a week.

## MODEMS

— All modems listed below  
are BT approved

### MIRACLE WS2000:

The ultimate world standard modem covers all common BELL and CCITT standards up to 1200 Baud. Allows communication with virtually any computer system in the world. The optional AUTO DIAL and AUTO ANSWER boards enhance the considerable facilities already provided on the modem. Mains powered £129(b). Auto dial Board/Auto Answer Board £30(c) each awaiting BT approval. Software lead £4.50.

### BUZZ BOX:

This pocket sized modem complies with V21 300/300 Baud and provides an ideal solution for communications between users, with main frame computers and bulletin boards at a very economic cost. Battery or mains operated, £62(c). Mains adaptor £8(d).

BBC to Modem data lead £7.

### EPROM PROGRAMMERS

Industrial Programmer P8000	£695(a)
Industrial Prod. Programmer P9010	£795(a)
Industrial Prod. Programmer P9020	£995(a)
Industrial Prod. Programmer P9030	£1295(a)
GANG OF EIGHT PRODUCTION POROGRAMMER	£395(a)

### UV ERASERS:

UV1B 6 Eprons	£47(b)
UV1T with timer 6 Eprons	£59(b)
UV140 14 Eprons	£71(b)
UV141 with timer 14 Eprons	£88(b)

## ALL PRICES EXCLUDE VAT

Please add carriage 50p unless  
indicated as follows  
(a) £8 (b) £2.50 (c) £1.50 (d)  
£1.00

We also stock a full  
range of  
TTLs CMOS, CPU's,  
RAMs, EPROMS.  
Please write for our  
catalogue.

## CONNECTOR SYSTEMS

### I D CONNECTORS

	Headers	Receptacles	Edge Conns	Grey Cable/m
10 Way	90p	85p	120p	40p
20 Way	145p	125p	195p	85p
26 Way	175p	150p	240p	120p
34 Way	200p	160p	320p	160p
40 Way	220p	190p	340p	180p
50 Way	235p	200p	390p	200p

### RS 232 JUMPER LEADS WITH 25 WAY CONNECTORS

24" Single end Male	£5.00
24" Single end Female	£5.25
24" Male to Male	£8.25
24" Female to Female	£9.50
24" Male to Female	£9.00

Other lengths available

### TEXTOL ZIF SOCKETS

24 pin	£7.50
28 pin	£9
40 pin	£12

### GENDER CHANGERS

25 Way D type	
Male to Male	£10
Female to Female	£10
Male to Female	£10

### AMPHENOL CONNECTORS

	Solder	IDC
36 Way Centronics Plug	500p	475p
36 Way Centronics Socket	550p	500p
24 Way IEEE Plug	475p	475p
24 Way IEEE Socket	500p	500p
PCB Mtg Skt		
Ang. Pin 36 Way	750p	24 Way 700p

### D CONNECTORS

	No of Ways	9	15	25	37
Male Solder		60p	85p	125p	170p
Angled Pins		120p	180p	240p	350p
IDC		175p	275p	325p	—
Female Solder		90p	130p	195p	290p
Angled Pins		160p	210p	290p	440p
IDC		195p	325p	375p	—
Hoods		90p	95p	100p	120p
Screwlock Hood		130p	150p	175p	—

## DISC DRIVES

BBC compatible disc drives, fully cased and supplied complete with cables, manual and formatting disc for operation with the BBC micro. These drives can operate in both single and double density modes and are suitable for use with any micro with Shuggart A400 interface. Mechanisms available separately.

### Single Drives:

1 x 100K 40T SS	TS100 £85(b)	PS100 with psu £125(b)
1 x 400K 80/40 DS	TS400 £125(b)	PS400 with psu £149(b)

### Dual Drives: Stacked Version:

2 x 100K 40T SS	TD200 £175(a)	PD200 with psu £200(a)
2 x 400K 80/40 DS	TD800 £250(a)	PD800 with psu £290(a)

### Plinth Version:

2 x 40T 100K SS	TD200P £195(a)	PD200P with psu £200(a)
2 x 400K 80T DS	TD800P £265(a)	PD800P with psu £305(a)

## 3M FLOPPY DISCS

Authorised Distributor  
Data Recording Products

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD £13(c)	40T DSDD £18(c)
80T SSDD £22(c)	80T DSDD £24(c)

## MONITORS

All monitors supplied with BBC lead

### MICROVITEC 14" RGB

1431 Standard Resolution	£165(a)
1451 Medium Resolution	£240(a)
1441 Hi Resolution	£389(a)

### MICROVITEC 14" RGB with PAL & Audio

1431 AP Standard Resolution	£205(a)
1451 AP Medium Resolution	£280(a)

### KAGA TAXAN 12" RGB

VISION II Hi Res	£225(a)
VISION III Super Hi Res	£325(a)

### MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
ZENITH 123 Hi Res 12" Green Screen	£70(a)
ZENITH 122 Hi Res 12" Amber Screen	£70(a)

## DRIVE ACCESSORIES

FLOPPICLENE Disc Head Cleaning Kit with 20 disposable cleaning discs ensures continued optimum performance of the drives.....£14.50(c)

Single Disc Cable	£6(d)	Dual Disc Cable	£8.50(c)
10 Disc Library Case	£1.80(d)	30 Disc Storage Box	£6(c)
40 Disc Lockable Box	£14(c)	100 Disc Lockable Box	£19(b)

## PRINTER SHARER/BUFFER

A unique printer sharer/buffer that provides a simple way to improve the utilisation of the installed equipment by reducing the waiting time for printing documents.

- \* STANDARD Centronics interface
- \* EACH input port scanned every 5 secs to check for data. Switching between ports completely automatic.
- \* Data input rate 4800 bytes/sec
- \* LED Bargraph indicates percentage memory used.
- \* COPY key allows current document to be reprinted.
- \* Internal check to prove the data integrity.
- \* PAUSE switch allows printing to be stopped temporarily to allow paper change, adjust form feed etc. or allows temporary storage for large number of small files which can all be printed together.
- \* RESET allows all buffer memory to be cleared without having to hard break on the computer.

\* 64K buffer capacity. \* Mains powered \* Compact 7cm x 17cm x 24cm  
TSB 64 Buffer/Sharer £205(a)  
Cable Set £30

## PRINTER/COMPUTER SHARERS

Three computers to one printer (Centronics — Cable Set (ea 1m long) £25(d)  
26 pin) £65(b) Three computers to one printer (Serial) £75(b)  
External power pack £6.50

# TECHNOMATIC LTD

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED  
SHOPS AT: 17 BURNLEY ROAD, LONDON NW10  
(Tel: 01-208 1177 (4 lines) Telex: 922800)  
305 EDGWARE ROAD, LONDON W2

PLEASE ADD 50p p&p & 15% VAT

(Export: no VAT, p&p At Cost)

Orders from Government Dep'ts. & Colleges etc. welcome.

Minimum Telephone Order £5.

Detailed Price List on request.

Stock items are normally by return of post.





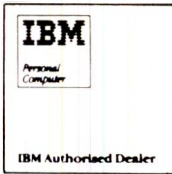
# LONDON COMPUTER CENTRE



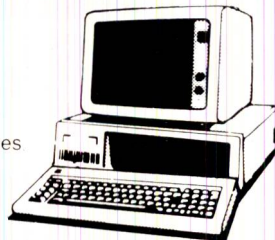
# ALL YOU NEED



## IBM PC, XT, Portable



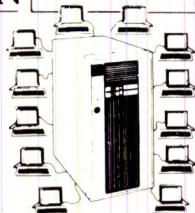
\*Networking  
\*Software  
\*Add-on boards  
\*In stock  
Telephone for prices



## NorthStar DIMENSION

The IBM compatible  
**Multi-user**  
system (up to 12 users)  
15Mb hard disk and 2 user stations  
complete with VDU running IBM graphics

Each subsequent work station  
(8088 CPU 128K RAM) **£6,300**  
**£1,450**



## apricot

F1 **£1,095**  
F1E **£ 895**  
Portable from **£1,695**  
PC twin S/S disks 256K **£1,595**  
PC twin D/S disks 256K **£1,795**  
X1 10Mb hard disk 256K **£2,545**



Save £285. LCC Special Bundle phone now!

## SANYO

### IBM Compatible 16 bit

550 1 X 160K drive **£ 749**  
550 2 X 160K drives **£ 775**  
555 2 X 160K drives **£ 999**  
550 2 X 800K drives **£1,085**  
555 2 X 800K drives **£1,170**  
**£600 or £1,200 of FREE software!**

## olivetti

M24 PC  
M24(XT) 10Mb hard disk  
M21 Portable



### PLOTTERS

HP 7470A 2 PEN **£895**  
HP 7475 6 PEN **£1521**  
ROLAND DXY 880 8 PEN, **£700**  
HP COMPAT **£400**  
EPSON H1-80 4 PEN A4

### MONITORS

KAGA 12" HI-RES RGB **£399**  
IBM-PC **£375**  
ROLAND DG 14" COLOUR **£129**  
KAGA 12" MON AMBER

### HARD DISKS & STREAMERS

#### IBM, APRICOT, OLIVETTI, SANYO

#### External:-

10 MB **£1295** | 30 MB **£2145**  
20 MB **£1545** | 40 MB **£2395**  
Streamer 25 MB **£895**  
20 MB + 20 Streamer **£2950**

#### Internal:-

10/20 MB **£995/£1295**  
10 MB Streamer **£850**

### MODEMS

BUZZBOX ANS/ORG F/DUP **£69**  
300/300  
EPSON CX-21 ACOUSTIC 300 **£160**  
MINOR MIRACLES DUAL  
BELL 103/CCITT  
300 F/DUP, 1200 H/DUP, **£130**  
75/1200 1200/75  
THORN VX544 AUTO DIAL/  
ANS 300/FDUP 1200/HDUP, **£180**  
75/1200 (PRESTEL)

### PRINTERS/ACCESSORIES

CANON 80 Col 160 cps **£ 299**  
CANON 156 Col 160 cps **£ 399**  
EPSON FX80/FX100 160 cps **£1,100**  
EPSON LQ 1500 Par/Se **£1,495**  
Fujitsu DPL 24 240 cps **£1,600**  
FLOWWRITER 1600 60 cps **£1,050**  
TEC F10 40 cps **£ 395**  
TEC F1500 25 cps **£ 399**  
JUKI 18 cps **£ 980**  
Fujitsu SP320 48 cps

### SOFTWARE

LOTUS 123 **£ 375**  
WORDSTAR PRO **£ 340**  
SYMPHONY **£ 470**  
D BASE II/III **£310/£420**  
Framework **£ 420**  
Delta **£ 420**  
Pegasus **phone**  
Multimate **£ 360**  
Supercalc 3 **£ 250**  
Exact Accounting **phone**  
Graphics Packages **phone**  
Languages, Communications **phone**

### PORTABLES

Compaq IBM Compat **£2,195**  
Chameleon IBM Compatible **£1,595**  
(16 bit/8 bit FREE SOFTWARE WORTH £1,000)

### LAP PORTABLES

NEC 8201 16K **£ 299**  
EPSON HX20 16K **from £ 402**

43 Grafton Way, London W1P 5LA (Opposite Maples)  
Opening Hours: 10-7 Mon-Fri. 10.30-4 Sat.  
01-387 4455 (4 lines) Telephone Answering Service After Office Hours  
Telex: 8953742

DEMONSTRATIONS  
SALES SERVICE  
SUPPORT

# DeSmet C Compiler

## FULL PROGRAMMING PACKAGE

- Compiler • Assembler
- Linker • Librarian
- Full screen editor • Overlay support
- 8087 and software floating point
- Complete implementation of C language
- Full function library
- Optional symbolic debugger and performance monitor
- DOS LINK — Microsoft compatible object modules

**£145**  
+ VAT

**£55** + VAT

**£45** + VAT

## C TOOLS AND UTILITIES

Full range of DOS, graphics, display generator, database, windows, communications, file handling, screen and GSX support utilities available. Ask for further details.

**sirius** IBM PC apricot AND 8086/8088  
MACHINES MSDOS & PC DOS (V1, V2) CP/M-86 CCP/M-86

**mlh**  
technology

14 Burgamot Lane  
Comberbach  
Cheshire CW9 6PB  
Tel: 0606-891146

Send operating system and disk details with order  
Manual £20 + VAT  
Refundable on purchase  
Post & Packing £3.50



# Training Programming Software



Framework for Thinkers

**LANTECH**  
Information Systems

55 Peasod Street  
Windsor, Berks  
Tel: Windsor  
58182/58013



# GALAXY WEST ONE

## BUSINESS SYSTEMS LTD

230 Tottenham Court Road, London W1P 9AE. Telephone: 01-636 7142/4102

Looking for a business system?  
Let us help you.  
Come to the first floor for expert  
advice and unbeatable price.



### apricot XI10 WITH 10MB WINCHESTER ONLY £1995 + VAT! PLUS

- FREE Monitor
- FREE Wordprocessor (Superwriter)
- FREE Spreadsheet (Supercalc)
- FREE Super Planner

#### INTEGRATED ACCOUNTS PACKAGE

- FREE Invoicing
- FREE Stock Control
- FREE Sales Ledger
- FREE Purchase Ledger
- FREE Nominal Ledger
- FREE Payroll
- FREE Mailing List



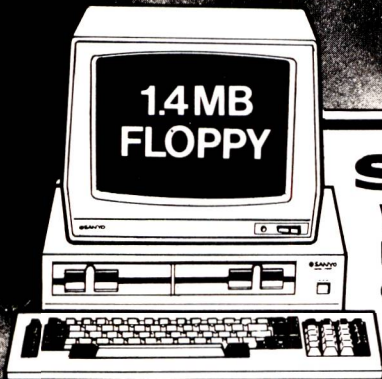
### SPECIAL IBM COMPATIBLE SANYO 550.

Features dual 360K disk drive, 256K Ram. Full IBM Colour Graphics, (including IBM Compatible Video Board and GW Basic). MSDOS 2.11. Wordstar and Calcstar. FREE Hi-Res Green Monitor. Runs Lotus 123 etc

**£995VAT**

Limited stock.  
Offer applicable only  
while stocks last.

**IBM  
COMPATIBLE  
550**



### SANYO 550 WITH 2x800KB FLOPPY DISC ONLY £995 + VAT!

#### PLUS

Includes 256K Ram and MSDOS 2.11

- FREE Monitor (Philips V7001)
- FREE Wordprocessor (Wordstar)
- FREE Spreadsheet (Calcstar)
- FREE Invoicing
- FREE Stock Control
- FREE Sales Ledger
- FREE Purchase Ledger
- FREE Nominal Ledger
- FREE Payroll
- FREE Mailing List

Integrated  
Accounts  
Package

### GALAXY BARGAINS

SANYO with 10MB Winchester 360K floppy, 256K Ram, MSDOS 2.11, Wordstar & Calcstar and Monochrome Monitor

**£1995 + VAT**

SANYO 775/10MX  
SPECIAL OFFER

The portable Sanyo with 10MB Winchester disk. Twin 360K floppies, 256K Ram, MSDOS 2.11, Integral 9 train, FREE SOFTWARE, FREE COLOUR PRINTER  
**£2795 VAT**

**PLUS FREE  
INTEGRATED  
ACCOUNTS  
PACKAGE  
WITH THESE  
SYSTEMS**

**TRAINING  
CAN BE  
PROVIDED ON  
ALL SYSTEMS  
SUPPLIED**

We also stock a wide range of Printers, Monitors, Disc Drives and Software Packages, plus many other Computer Systems at bargain prices.

**1 YEAR  
WARRANTY &  
MAINTENANCE  
CONTRACTS  
AVAILABLE**

OPENING HOURS MON-SAT 9AM-6PM

MAIL ORDERS TO: West One Galaxy Business Systems Ltd,  
230 Tottenham Court Road, London, W1.  
Cheques payable to: West One Galaxy Business Systems Ltd.





# The **XLtron** **MEGA•BOX** from Disco•Tech (UK) Ltd.

The MEGA BOX is a top quality rigid plastic storage box with see-through lid and four dividers. Holds up to 60 diskettes.

All disks are 5¼" and feature:

- Write protect notch
- Hub rings
- Double density (D/D) suitable for single density (S/D)
- Tyvex sleeves
- Full set of labels and write protect tabs
- Meets all ANSI specifications

## **XLtron** Floppy Disk Prices

25 SS/DD disks in **MEGA•BOX** £29 plus VAT £4.35 and £2 p&p = **£35.35**

25 DS/DD disks in **MEGA•BOX** £39 plus VAT £5.85 and £2 p&p = **£46.85**

50 SS/DD disks in **MEGA•BOX** £50 plus VAT £7.50 and £2 p&p = **£59.50**

\*50 DS/DD disks in **MEGA•BOX** £70 plus VAT £10.50 and £2 p&p = **£82.50\***

10 SS/DD disks in **mini•box** £13 plus VAT £1.95 and £2 p&p = **£16.95**

10 DS/DD disks in **mini•box** £18 plus VAT £2.70 and £2 p&p = **£22.70**

\*£5 PRICE REDUCTION

## **SUPERDISK**

XLTRON's 96 tpi (80 track) disk  
Suitable for any disk requirement or use. Individually tested and certified in our London laboratory.

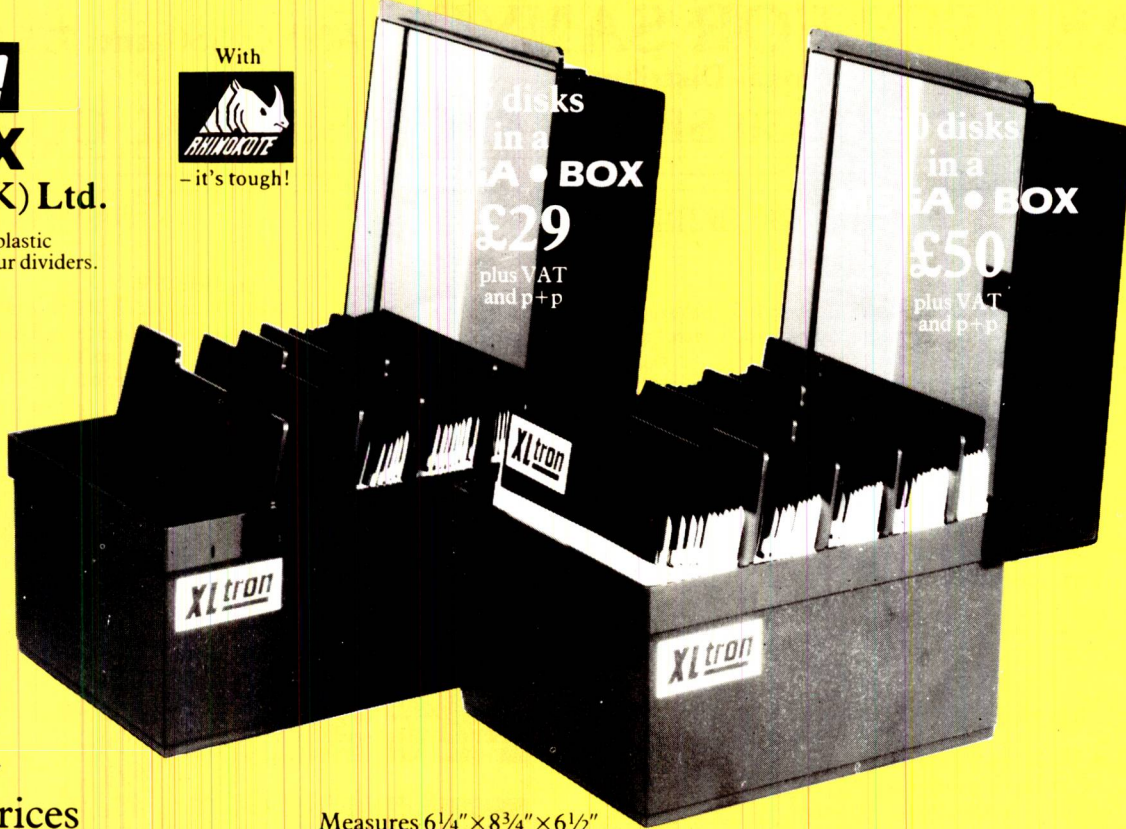


10 in a **mini•box** £19 plus VAT £2.85 and £2 p&p = **£23.85**

15 in a **mini•box** £25 plus VAT £3.75 and £2 p&p = **£30.75**

25 in a **MEGA•BOX** £42 plus VAT £6.30 and £2 p&p = **£50.30**

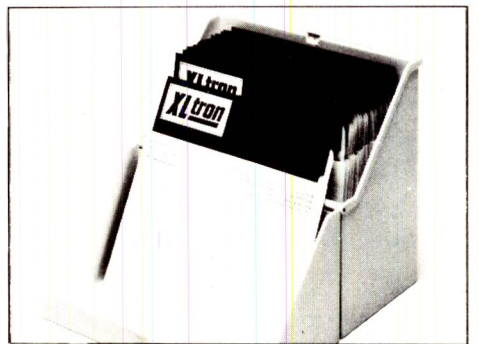
50 in a **MEGA•BOX** £80 plus VAT £12 and £2 p&p = **£94.00**



Measures 6¼" x 8¾" x 6½"

## **THE midi•box**

15 DS/DD disks in our **midi•box** at a bargain price. Our new **midi•box** has some great features. It's made of high impact plastic and holds up to 30 5¼" disks, but is one of the neatest on the market. Measuring only 6" x 6" x 3", the rigid lid conveniently holds the disks you are working on ready to hand. And with 15 DS/DD disks its a bargain at only £20 plus £3 VAT and £2 p&p = £25.



## **Suitable For Most Popular Micros**

XLTRON disks are recommended for BBC, IBM PC, Atari and Commodore computers. If you need advice on other micros just ring 01.631 0255

## **Our Quality Promise**

You can order with confidence. We buy disks from international manufacturers to our specifications, then test, retest and grade them in our London laboratories.

## **Fully Guaranteed**

The XLTRON quality control is so stringent that we can give our famous 'two for one' guarantee. If you find a faulty disk, return it to us, and we'll send you two in exchange immediately. All part of our five year guarantee.

© TYVEX is a registered name of Du Pont.  
© Rhinokote is a registered name of Rhino Magnetics Ltd.  
© XLTRON is a registered name of XLTRON Ltd.

## **Personal Callers Very Welcome**

We're now established in our new showroom in Alfred Place. You can save our £2 delivery charge by calling in - you'll be welcome weekdays from 10.00am till 5.00pm Saturday 10.00am-4.00pm.

## **Help Lines**

**01-631 0255**

**01-631 3600**

If you want help or information to place an order just ring our 'help' lines.

## **Official Orders**

We accept orders from all government bodies, schools, universities, libraries, armed forces etc. We despatch on receipt of an official purchase order. If you can't raise a cheque without an invoice, just post or telephone your order and we'll send you a pro-forma by return.

**To: Disco•Tech (U.K.) Ltd., Lex House, 3-6 Alfred Place, London WC1, England**

Just fill in the coupon or send your order on a postcard or letter. Or phone your order on 01.631 3600 OR 01.631 0255

Please send me the following, (tick the appropriate boxes):

\_\_\_\_\_ (QTY) ☐ SS/DD ☐ DS/DD ☐ SUPERDISK disks in a

☐ **MEGA•BOX** ☐ **midi•box** ☐ **mini•box**

I enclose a cheque/p.o. for £\_\_\_\_\_ or debit my Access/Diners/Amex card

card no. \_\_\_\_\_

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_ Postcode: \_\_\_\_\_

(Block Capitals Please)

PCW/6/85

**Disco•Tech (U.K.) Ltd.,  
Lex House, 3-6 Alfred Place,  
London WC1, England.**

Disco•Tech (U.K.) LTD. are the  
sole distributors of XLTRON.



# AKHTER FOR SANYO

550 Series Educational Distributors      SANYO 550 and 775 Business Computers  
775-10MX Distributors

## SANYO 550 SERIES PROFESSIONAL COMPUTERS

### SANYO 550 SERIES

Sanyo MBC 550  
16 Bit Micro. 256k RAM. Built in full colour graphics. MS DOS 1.25 operating system. Single 160k disc drive. Free green monitor. Free software including WordStar and CalcStar  
£749 + VAT £862

Sanyo 550-1X With Dual 160k Disc Drives £799 + VAT £919

Sanyo 550-360X With Dual 360k Disc Drives  
MS DOS 2.11 operating system £899 + VAT £1034

Sanyo 550-800X With Dual 800k Disc Drives £999 + VAT £1149

Sanyo 550-10MX With single 10 Megabyte integral drive, 360k or 800k floppy, MS DOS 2.11 operating system.  
£1995 + VAT £2295

### SANYO 555 SERIES

Sanyo MBC 555  
16 Bit Micro. 256k RAM. Built in full colour graphics. MS DOS 1.25 operating system. Dual 160k disc drives. Free green monitor. Free software including WordStar, CalcStar, InfoStar, DataStar etc.  
£999 + VAT £1149

Sanyo 555-360X With dual 360k disc drives MS DOS 2.11 operating system  
£1099 + VAT £1264

Sanyo 555-800X With dual 800k disc drives £1199 + VAT £1379

Sanyo 555-10MX With single 10 Megabyte hard disc, 360k or 800k floppy, MS DOS 2.11  
£2195 + VAT £2525

### SANYO MONITORS

CD 3125 Standard Res  
Colour Monitor  
£155 + VAT £178

DM 8112 Standard Res  
Green Monitor  
£86 + VAT £99

SANYO  
MBC  
550  
SERIES



NOW  
WITH  
256K  
RAM

NEW

Sanyo MBC 775 Portable  
256k Ram MS DOS 2.11  
Integral 9" Colour  
Screen Free Software -  
WordStar and CalcStar  
£2150 + VAT £2473

## NEW SPECIAL OFFER

Dual 360k drives 256k Ram MS DOS 2.11 Full IBM colour graphics (includes IBM compatible video board and GW basic) Runs Lotus 123 etc.

IBM Compatible version of the Sanyo 550

£995 + VAT £1145

OFFER APPLICABLE ONLY WHILST LIMITED STOCKS LAST

NEW

Sanyo MBC 775 Portable. 256k Ram MS DOS 2.11 Integral 9" Colour Screen Free Software - WordStar and CalcStar  
£2150 + VAT £2473

## SPECIAL OFFER

Sanyo MBC 775-10MX With single integral 10 Megabyte winchester hard disc dual 360k floppies, IBM Hardware slot, FREE colour printer  
£2795 + VAT £3215

### APRICOT BUSINESS PACKAGES

Apricot PC 16 Bit Micro 256k Ram Up to 1.44 Megabyte of floppy storage on twin 3.5" Sony discs  
Portable brief case styling  
Apricot with dual drives, monitor + free printer  
£1790 + VAT £2059

Apricot XI 16 Bit Micro 256k Ram 10 Megabyte Winchester hard disc single 315k floppy  
FREE software and Juki 6100 printer  
£2995 + VAT £3444

ALSO AVAILABLE: NIMBUS AND OLIVETTI M24 : RING FOR DETAILS



AKHTER INSTRUMENTS LTD T/A  
AKHTER COMPUTER GROUP  
28/29 BURNT MILL  
HARLOW  
ESSEX  
CM20 2HU



Opening Hours: Mon - Fri 9 a.m. - 6.30 p.m.  
Sat 10 a.m. - 5 p.m.

CALLERS WELCOME AMPLE PARKING

DELIVERY: Securicor 'A' Service  
£8.00 per parcel  
Securicor 'B' Service  
£5.00 per parcel  
Postal Service £1.50 per parcel



0279/443521 (10 lines)

Telex: 818894 AKHTER G.

RET



# AKHTER FOR PRINTERS, MONITORS and CONSUMABLES



## DOT MATRIX PRINTERS

All printers have centronics parallel interface unless otherwise stated.  
All printers have hi-res dot addressable graphics mode.

### EPSON

FX 80 160 CPS 10" Wide friction + pin feed	£324 + VAT £373
FX 100 160 CPS 15" Wide friction + pin feed	£439 + VAT £505
RX 80 F/T 100 CPS 10" Wide friction + pin feed	£225 + VAT £259
RX 80 100 CPS 10" Wide tractor feed	£215 + VAT £247
RX 100 F/T 100 CPS friction and tractor feed	£349 + VAT £401
8143 RS232 Interface for FX and RX printers	£39 + VAT £45
8143 RS232 Interface with 2k buffers; x on, x off	£60 + VAT £69
Ribbon cartridge for RX 80, FX 80 and MX 80	£5 + VAT £6
Ribbon cartridge for FX 100 and MX 100	£7 + VAT £8
MP 165 165CPS 10" Wide friction and tractor feed NLQ	
Epsom Compatible	£249 + VAT £286

### TAXAN KAGA

160 CPS 10" Wide 27 CPS NLQ 24x16 Matrix	£255 + VAT £293
160 CPS 15" Wide 27 CPS NLQ 24x16 Matrix	£359 + VAT £413

### CANON

PW 1080A 160 CPS 10" Wide NLQ friction and tractor feed	£269 + VAT £309
PW 1156A 160 CPS 15" Wide friction and tractor feed	£379 + VAT £436

## DAISYWHEEL PRINTERS

### JUKI 6100

20 CPS Bi-directional, logic seeking 10/12/15 CPI plus PS spacing, 2k buffer... THE BEST SELLING DAISYWHEEL!... £324 + VAT £373

Single sheet feeder	£199 + VAT £229
RS232 Interface	£50 + VAT £58
Tractor Unit	£129 + VAT £148
Spare Daisywheel	£14 + VAT £16

### SPECIAL OFFER

Smith Corona Fastex 80: 80CPS, Friction Feed, 80 column, centronics parallel interface. £129 + VAT £149

# HURRY . . . . .

OFFER ONLY APPLICABLE WHILE  
STOCKS LAST.

All Printers Carry A One Year Warranty

## SANYO COLOUR MONITORS

CD 3125 Standard Resolution	£155 + VAT £178
CD 3117 Medium Resolution	£299 + VAT £344
CD 3115 High Resolution	£399 + VAT £459

All Sanyo Colour Monitors come with a free Monitor Stand

## SANYO GREEN MONITORS

DM 8112 12" 18 Mhz Hi Res	£86 + VAT £99
DM 9112 12" 18 Mhz Hi Res with tilt stand	£99 + VAT £144

## PHILIPS

7001 High Resolution Green Screen with sound input £69 + VAT £79

## MICROVITEC CUB

1431 MS 14" RGB Standard Resolution Colour	£199 + VAT £229
1451 MS 14" RGB Medium Resolution Colour	£249 + VAT £286
1441 MS 14" RGB High Resolution Colour	£399 + VAT £459

## CONSUMABLES:

3M Diskettes: 48TPI SS DD Diskettes (Box of 10)	£15 + VAT £17.25
48TPI DS DD Diskettes (Box of 10)	£18 + VAT £21.00
96TPI DS DD Diskettes (Box of 10)	£25 + VAT £29.00

Ribbons: Epson MX/RX/FX 80	£6 + VAT £6.90
Epson MX/RX/FX 100	£8 + VAT £9.20
Seikosha GP 100	£4 + VAT £4.60
Star Gemini 10X	£5 + VAT £5.75
Shinwa CP 80	£6 + VAT £6.90
Juki 6100	£2 + VAT £2.30

Daisy Wheels: Juki	£13 + VAT £14.95
Brother	£13 + VAT £14.95

Paper: 200 Sheets Draft Quality	£14 + VAT £16.10
200 Sheets Letter Quality A4	£15 + VAT £17.25

## ACCESSORIES:

Leads: Phono to Phono	£3 + VAT £3.45
BNC to Phono	£3 + VAT £3.45
7 Pin to 3 Jack	£3 + VAT £3.45
7 Pin to 5 Pin (+ remote)	£3 + VAT £3.45
7 Pin to 7 Pin	£3 + VAT £3.45
Std UHF Lead	£3 + VAT £3.45
Sanyo Monitor Lead RGB	£10 + VAT £11.50
Microvitec Mon Lead RGB	£5 + VAT £5.75
BBC Centronics Print Lead	£10 + VAT £11.50

A large selection of printer and disc drive leads are held in stock and can be quoted for upon request.



AKHTER INSTRUMENTS LTD T/A  
AKHTER COMPUTER GROUP  
28/29 BURNT MILL  
HARLOW  
ESSEX  
CM20 2HU

DELIVERY: Securicor 'A' Service  
£8.00 per parcel  
Securicor 'B' Service  
£5.00 per parcel  
Postal Service £1.50 per parcel



0279/443521 (10 lines)

Telex: 818894 AKHTER G.



Opening Hours: Mon - Fri 9 a.m. - 6.30 p.m.  
Sat 10 a.m. - 5 p.m.

CALLERS WELCOME AMPLE PARKING



We welcome enquiries  
from first class  
distributors and dealers.

**CLIENTS**

Client no. 112  
Name Goodbuck, Jo  
Address 180 Main Str  
City Davis  
Zip & State 95699 Califo

**STOCK LIST**

Client no: 112

Stock	Quantity	Date of p
AT&T	450	07-14-
IBM	900	12-28-
ITT	200	10-12-
SIRIV	465	01-05-

**MONTHLY**

02-07-

Dear Mr. Goodbuck!

We have the pleasure to report that Your stock portfolio now has the following contents and value:

STOCK	QUANTITY	TOTAL VALUE	PRO	st value	Total
AT&T	450	9337.50		20.750	9337.50
IBM	900	122850.00		136.500	122850.00
ITT	200	6175.00		30.875	6175.00
SIRIV	465	22552.50		48.500	22552.50

GO APPEND FIND SORT MARK COPY NEW\_FILE JOIN PACK VIEW UPDATE  
TO\_PRINTER DELETE RUN XIT  
F:MONTHLY R:112 D:02-07-85 T:11:23 M:87564

Too many integrated software packages force you to trade power for integration. Especially in their data base environment. The Digilog C5 reflects our idea that powerful collecting, manipulating and maintaining of data is a very essential part of any integrated software package.

Digilog C5 is a window based integrated software environment that easily exchanges data between its parts without sacrificing the power and flexibility you get from the best separate programs on the market.

Unlike some of our well-known competitors you do not have to buy a separate data base if you need to handle more than a small amount of information.

- A relational database with dynamic, unlimited length records. Unlimited number of records, key fields, search and sort conditions and relations.

- A structured programming language to build your own automatic applications like general ledger, accounts, etc.

- A 3 dimensional "stacked" spreadsheet environment. Unlimited number of rows and columns. Empty positions do not occupy memory space. Easy access to all database information.

- A word processing and report writing environment with full access to all spreadsheet and database information.

- A graphics function that puts your spreadsheet and database information into easy to understand pictures.

Extensive use of "prompting" and context sensitive help screens.

Digilog C5 is very sensibly priced below £400.00 retail excl. VAT and runs on IBM PC, XT and compatibles with minimum 256K and 1 disk drive.

Distributors and OEM's: Please contact Mr Lennart Ahden at tel. +46 (8) 34 34 49 or telex 21869 for information on our distributor and OEM terms.

Dealers: Please contact Mr Poul Heye at tel. +46 (8) 34 34 49 about our dealer introductory offer.



*Digilog C5*

**DIGILOG**

Box 5110, 402 23 GOTHENBURGH, Sweden

Tel. 08-34 34 49, 031-20 29 00.

Telex. 21869 AHDEN S.



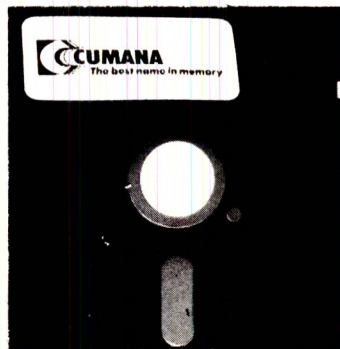


**NEW  
LOW  
PRICES**



**NEW  
LOW  
PRICES**

## CUMANA DS/DD DISCS IN THEIR OWN LIBRARY BOX



1-5 BOXES DS/DD 96 TPI	£17.50 + VAT
6-10 BOXES DS/DD 96 TPI	£17.00 + VAT
10- BOXES DS/DD 96 TPI	£16.50 + VAT

**48 HOUR DELIVERY SERVICE**

**Southfield House, 11 Liverpool Gardens, Worthing, Sussex BN11 1RY**  
**Telephone: Worthing (0903) 213174**

[illegible]

**Tel: (0924) 409753 for Credit Card Orders only.**  
**EXPORT ORDERS WELCOME**

Shop open 9-5pm Mon-Sat; Mail Order 9-8pm Mon-Sat  
Answerphone outside these hours.

**EXPORT ORDERS WELCOME**



# LAST APPLE AND G MAXIMS

## INCREDIBLE BARGAINS IN APPLE HARDWARE, SOFTWARE AND SYSTEMS

### \* Apple Macintosh 128K computer

Previous price £1798.99

Plus **FREE** case – normally £44.99

**ONLY £1398.99**  
SAVE £400

### Apple Macintosh disk drive 400K storage **ONLY £349.99**

Previous price £399.99

SAVE £50

### \* Apple IIc computer 128K RAM

Previous price £999.99

**ONLY £799.99**  
SAVE £200

### Apple IIc monitor, green screen

Previous price £159.99

Plus **FREE** stand – normally £29.99

**ONLY £129.99**  
SAVE £30

### Apple IIc disk drive 143K storage

Previous price £259.99

**ONLY £199.99**  
SAVE £60

### Apple Imagewriter dot matrix printer

Previous price £439.99

Plus **FREE** interface kit including lead and manual – normally £44.99

**ONLY £379.99**  
SAVE £60

## APPLE PROGRAMS

### 'Filevision' filing program

Previous price £179.99

**ONLY £129.99**  
SAVE £50

### Mac 'Multiplan' spreadsheet

Previous price £169.99

**ONLY £129.99**  
SAVE £40

### Mac Main Street Filer database filer

Previous price £169.99

**ONLY £139.99**  
SAVE £30

### Mac 'Megamerge' filing/merging program

for mailing. Previous price £99.99

**ONLY £79.99**  
SAVE £20

### Apple IIc Imagewriter

Previous price £439.99

Plus **FREE** interface kit including lead and manual – normally £44.99

**ONLY £379.99**  
SAVE £60



# 3 SLICE PRICES VEY YOU X VALUE!

Even bigger savings on a complete Apple system.

Apple IIc computer, disk drive, monitor and stand.

**Apple Works:** word processor/database/  
spreadsheet. Previous price £1309.95

**ONLY £1199.00**  
**SAVE £110.95**

Apple offers subject to availability at these selected Laskys stores: Aberdeen, Birmingham, Brighton, Ealing, Edinburgh, Enfield, Glasgow, Guildford, Leeds, Liverpool London: Brent Cross and 257 & 42 Tottenham Court Road, Manchester, Newcastle, Nottingham, Peterborough, Sheffield,.

\*Some ex-demonstration.

## SPECIAL MSX OFFERS

**Sony HB75** 64K RAM MSX computer

**ONLY £299.99**

**FREE Sony TCM 737** cassette recorder – normally £39.99

**JVC HC7 G.B.** 64K RAM MSX computer

**ONLY £279.99**

**FREE software pack** (for business, home or entertainment)

**Toshiba HX10** 64K RAM MSX computer

**ONLY £239.90**  
**SAVE £40**

Previous price £279.90 (selected stores only)

**FREE Omega** data recorder – normally £24.99 and

**FREE Toshiba J400** joystick – normally £12.99

**ALL PRICES QUOTED INCLUDE 15% VAT**

## MORE TO OFFER PLEDGE

**MORE CHOICE:** All the top brands and all the latest models.

**MORE EXPERTISE:** Expert advice and demonstrations.

**MORE GUARANTEES:** Up to 2 years free\*, with the option to extend up to 5 years for a small premium.

**MORE SATISFACTION:** Free 14 day exchange period.

**MORE AFTER SALES SERVICE:** Expert service from our Servicepoint network engineers.

**MORE PAYMENT OPTIONS:** Cash, cheque, major credit cards, instant credit up to £1,000. \*\*

\*2 year parts and labour Guarantee on Hi-Fi and TV. 1 year on VCR's, portables, video cameras, computers and peripherals.

\*\*Ask one of our sales staff for full details. Laskys Credit Brokers. Typical Budget Account A.P.R. From 31.3% variable.

## UP TO £1,000 INSTANT CREDIT

Ask one of our sales staff for full details. Laskys Credit Brokers.

Typical Budget Account A.P.R. From 31.3% variable.

All credit offers subject to acceptance by Laskys Credit Brokers. Ask for written details. Typical APR 31.3% subject to status. Prices correct at time of going to press. All offers subject to availability. No indication is given, or is meant to be given, that merchandise has been offered at its 'original price' for a continuous period of not less than 28 days in the preceding six months. Previous prices quoted have been charged by our store at 42 Tottenham Court Road, London.

# LASKYS

**MORE ON OFFER - MORE TO OFFER**



## Announcing the MIRAGE MICRODRIVER

At the touch of a button you can transfer *all* your programs onto Microdrive cartridge.

At last the full potential and speed of the ZX Microdrives can be realised by all Spectrum and Spectrum+ owners, for only £39.95.

### Features:

Transfer *any* program onto Microdrive cartridge or cassette.

Freeze *any* game at *any* point, save it, and restore it later.

Use the "POKE" facility to give yourself infinite lives etc.

The Mirage Microdriver consists of a RAM PACK style case which simply plugs onto the rear of the ZX Interface 1. An expansion connector is provided for the connection of other peripherals.

The software has been designed to be easy to use and is menu driven. It resides on a 4k ROM contained within the Microdriver so there is no fussing with tapes to get it to run. All you need to do is press the button on the side.

Note: This unit is intended for software owners to transfer their own programs onto Microdrive cartridges for speed and ease of access. Programs saved using the Mirage Microdriver are *unreadable* unless the Microdriver is present.

### How to order

Send a cheque for £44.95, including £5 for postage and packing, to the address below, or use your Access or Visa card.

Please allow 28 days for delivery.



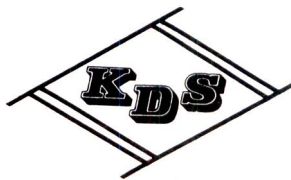
**MIRAGE**

Microcomputers  
Limited

**MIRAGE MICROCOMPUTERS LTD.**

24 Bank Street  
Braintree  
Essex CM7 7UL

Tel: Braintree (0376) 48321



8 BIT CENTRONICS  
INTERFACE. MAKE USE  
OF THAT 8 BIT PRINTER.  
PLUGS IN BETWEEN  
CENTRONICS PORT AND  
PRINTER CABLE

**ONLY £19.95**

## AMSTRAD CPC464 INTERFACES

### ★ RS-232 ★

COMMUNICATE WITH YOUR MODEM  
TALK TO OTHER COMPUTERS  
USE SERIAL PRINTERS  
SPLIT BAUD RATES  
STANDARD 25 WAY  
'D' CONNECTOR

### ★ PARALLEL ★

MAKE THAT ROBOT MOVE  
RUN HEATING SYSTEMS  
TWIN 8 BIT PORTS  
OPERATES DIRECT FROM BASIC  
2 x 14 WAY SPEEDBLOC  
CONNECTOR

**£45.95** PRICE INCL VAT & P/P **£25.95**

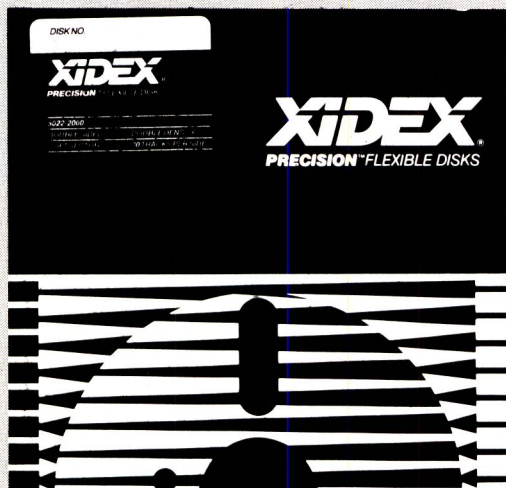
BOTH UNITS CASED AND INCLUDE THROUGH  
CONNECTOR FOR INTERSTACKING OR  
CONNECTION OF FURTHER ADD-ONS (DISC  
DRIVE ETC)  
LITERATURE SUPPLIED AND SOFTWARE ON  
TAPE

**K.D.S. ELECTRONIC'S**  
**TEL (04853) 2076**

15 HILL STREET, HUNSTANTON,  
NORFOLK PE36 5BS

# XIDEX®

ONE STEP AHEAD



Unlike most disk manufacturers, Xidex maintains total control of the manufacturing process. The company performs every stage of manufacturing in house, beginning with the coating of the polyester base. This total control is indicative of Xidex's commitment to quality and is the reason why Xidex Precision Flexible Disks have set new standards for disk performance and workmanship.

## PRECISION™ FLEXIBLE DISKS

"WORLD LEADER IN POLYESTER  
COATING TECHNOLOGY"

**FROM £19.75**

XIDEX SEE 10 Library Case, Pen & Memo Pad with every 10 disks OR  
Desk-top Diskette Box, Cleaning Disk, Pen & Memo Pad with every 50 disks.

5¼" Boxes of 10				1 – 4	5 – 9	10 +	Qty Req.	Cost
SS/DD 48tpi	5012.1000	£19.75	£19.25	£18.75				
DS/DD 48tpi	5022.1000	£29.75	£28.95	£28.15				
SS/DD 96tpi	5012.2000	£29.70	£28.90	£28.10				
DS/DD 96tpi	5022.2000	£34.75	£33.75	£32.75				
P & P per box		.95	.70	FOC				
8" Boxes of 10		1 – 4	5 – 9	10 +				
SS/DD	8012.1000	£27.75	£26.95	£26.15				
DS/DD	8022.1000	£32.75	£31.75	£30.75				
P & P per box		1.50	1.00	FOC				
3½" Boxes of 10		1 – 4	5 – 9	10 +				
SS/DD	3012.3000	£37.95	£37.25	£26.65				
P & P per box		.75	.50	FOC				
NAME_____						Nett Price		
Address_____						VAT @ 15%		
_____						TOTAL AMOUNT £		
Postcode_____ Tel_____						Send cheque with order to:		
<b>NO EXTRA CHARGE FOR C.O.D.</b>								
<b>MICRO-TIME</b> Computer Service, Mail Order Dept., <b>FREEPOST</b> , Curry Rivel, LANGPORT, Somerset TA10 0JE								
PCW/6/85								



## HIGH TECH SOFTWARE COMPANY NEEDS HIGH FLYERS

Pathtrace Ltd is a small software company, specialising in CAD/CAM applications on microcomputers.

We are probably the fastest growing CAD/CAM company in the UK and have marketing outlets in the UK, USA, Canada, Europe and the Far East. To support the ever-increasing market demands, we need immediately four additional software staff who can demonstrate an unusually high potential, creative ability and commitment.

The rewards, job satisfaction, and prospects are excellent.

Applicants must be numerate and have solid experience of one or more high level languages, especially BASIC under MSDOS or CPM. We would normally expect applicants to have (or expect to obtain this year) a good level honours degree in a quantitative subject. We would also consider applicants with substantial practical micro experience without a degree.

*Please reply directly to:*

**Mr N. GILBERT**  
Technical Director  
Pathtrace Ltd  
Pathtrace House  
91-99 High Street  
BANSTEAD  
Surrey SM7 2NL



pathtrace Ltd

SPECIALISTS IN SYSTEMS FOR COMPUTER-AIDED ENGINEERING

## COMPUTER TEACHERS REQUIRED (Short Term)

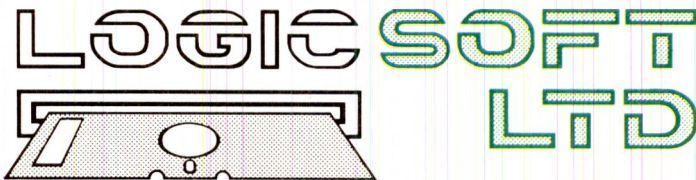
Large organisation covering the South West of England from Gloucester to Penzance requires Experienced Teachers at a number of locations to instruct its employees in Basic Computing over a period of eight weeks for one evening (3 hours) per week starting in September.

The necessary training equipment and full support from the organisation's own Training and Computer Departments will be provided, and successful applicants will receive £5 per hour for the duration of the training.

Knowledge of, and experience in using Acorn Electron or BBC Model B computers is necessary.

*If you are interested in undertaking this temporary work, please write giving full details of your career including relevant experience to:*

**BOX NO. BW**  
V.N.U. BUSINESS PUBLICATIONS  
EVELYN HOUSE  
62 OXFORD STREET  
LONDON W1A 2HG



TEL: (09904) 4919  
or (0860) 315172

FRAMEWORK	321.75	CROSSTALK	123.75
FRIDAY	146.25	HARVARD PROJECT MANAGER	281.25
DBASE 11	237.25	MICROSOFT PROJECT	176.25
DBASE 111	321.75	THINK TANK	123.00
DBASE MANAGER	183.75	SPOTLIGHT	78.75
LOTUS 1-2-3	276.50	SUPERCALC 2	136.50
SYMPHONY	385.00	SUPERCALC 3	206.50
ELECTRIC DESK	213.75	ALPHA APPLE/IBM CONNECTION	146.25
WARNER DESK ORGANIZER	161.25	OPEN ACCESS	315.00
SIDEKICK	42.47	R. BASE 4000	321.00
IBM PC MOUSE/S'WARE	157.50	CLOUT	112.50
MICROSOFT WORD/MOUSE	329.00	NORTONUTILITES (VER.3)	68.70
MULTIMATE	318.50	FLASHCALC	66.75
WORDSTAR PROFESSIONAL	296.25	OZ	255.00
WORDSTAR 2000	330.00	FLIGHT SIMULATOR	38.50
VOLKSWRITER	123.00	DAZZLE DRAW	35.00
VOLKSWRITER DELUXE	185.25	BRODERBUND ARCADE	35.00
BANKSTREET WRITER	43.50	TYPING TUTOR 111	29.40

*your user friendly supplier*

ALL PRICES EXCLUSIVE OF VAT, BUT INCLUDE FREE DELIVERY

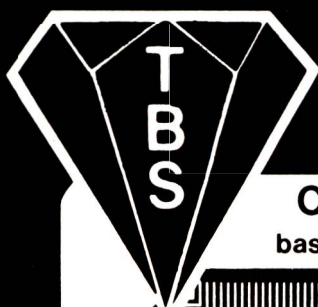
\* PRICES AND AVAILABILITY SUBJECT TO CHANGE WITHOUT NOTICE

\* RING US FOR THE LOWEST PRICE POSSIBLE ON MANY OTHER PROGRAMS

\* WE WILL ENDEAVOUR TO BEAT ANY PRICE QUOTED

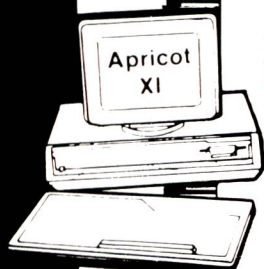
P.O. BOX 210, VIRGINIA WATER, SURREY, GU25 4QJ. TEL: (09904) 4919 or (0860) 315172 TELEX: 858623





# Tailored Business Systems

Complete Business Systems Tailored To Your Needs  
based on Apricot, Sperry, IBM, Hewlett Packard, Sirius, Canon, Epson & Brother

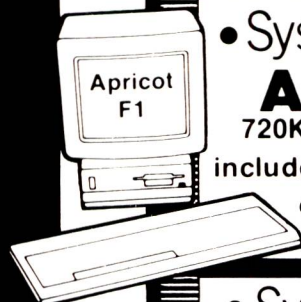


- System 1 •  
**APRICOT XI**  
Hard Disk + Free Printer +  
Free Integrated Accounts  
Software including Payroll  
Training & Installation  
★ **£2995** + VAT

- System 2 •  
**SPERRY**  
MODEL 40  
**10 MEGABYTE  
HARD DISK**  
★ Free Printer ★  
★ Free Integrated  
Accounts Package ★  
★ **£3295** + VAT

**FREE**

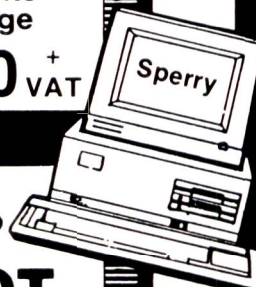
**initial TRAINING  
given with each  
system supplied**



- System 3 •  
**APRICOT F1**  
720K Disk 256K Memory  
includes Integrated Accounts Software  
or Printer ★ **£1495** + VAT



- System 4 •  
**SPERRY**  
MODEL 25  
COLOUR MONITOR  
360K Twin Drive  
★ Free  
Integrated  
Accounts  
Package ★  
**£2450** + VAT



- System 5 •  
**APRICOT  
TWIN DISK**  
+ Free Word Processor  
+ Free Printer  
★ **£1795** + VAT

- System 6 •  
**IBM XT**  
Hard Disk +  
Full Integrated  
Accounts Package  
including Payroll  
+ Free Printer  
★ **£4290** + VAT

- System 7 •  
**APRICOT  
POINT 7**  
with up to 6  
Terminals & *Integrity*  
Multi User Accounts  
Package  
From  
★ **£3995** + VAT  
*Depending on number  
of Terminals*

- System 8 •  
**APRICOT POINT 32**  
with up to 32  
Terminals including  
*Integrity* Multi User  
Accounting Software  
From  
★ **£3995** + VAT  
*Depending on number  
of Terminals*

■ **Authorised ACT & SPERRY Dealers** ■

**Full Maintenance available ■ Leasing Facilities arranged**



## Tailored Business Systems Ltd

2nd Floor, Gate House, The High, Harlow, Essex CM20 1LW

CONTACT US ON... **0279 413893** (10 lines)



► **LOGISTIX** (n) a powerful spreadsheet with an extensive database and containing truly superior presentation-quality graphics. *Logistix also includes: the fourth dimension — (1) time management; (2) resource allocation; (3) task scheduling; (4) project planning. Commonly referred to as '... the best idea in business software since the spreadsheet'.*

#### THE INDISPENSABLE PLANNING AND DECISION AID

No business remains static. You need to know not only what is going on today, but what should be happening next week, next month or next year. So you need the right kind of information in a form you can use and understand, you need to be able to analyse it in various ways and you need to be able to present it to others. Most important of all, you need to make decisions about the future. In short, you need to plan.

Logistix adds the all-important feature of time management to classic spreadsheet features, an extensive database capability and presentation quality graphics, to provide a versatile, powerful and easy to use planning and decision aid for managers and professionals.

**LOGISTIX — The best idea in business software since the spreadsheet.**

- DATABASE
- TIMESHEET
- SPREADSHEET
- GRAPHICS



Grafox Limited  
65 Banbury Road  
Oxford OX2 6PE  
Tel. (0865) 516281



# Modem WS 2000: why it's the experts' choice.

You don't need to be told about the information revolution – you already know that without efficient data communications, you and your business may not survive it.

And you know that a modem will be a vital part of your survival kit.

This is why you should choose Modem WS2000 from Miracle Technology.

**Quality** – In concept and construction Miracle Technology sets the standards other modem manufacturers aim for.

Quite simply, WS2000 is one of the best designed, best made modems you can buy.

It is approved for PTT use in the UK and Holland, with approval pending in other European countries.

**Flexibility** – As a multi-speed, multi-standard modem, WS2000 enables data transfer between almost any two computers – world-wide.

WS2000 gives instant access to the vital information sources of Prestel, Micronet, Telecom Gold and a vast range of public and private databases.

WS2000 can also convert your computer to a telex terminal, giving you inexpensive 2-way international telex facilities.

WS2000 is suitable for use with a wider range of computers than virtually any other modem, and we can offer software packages for most makes.

**Versatility** – No other modem offers all the facilities available with WS2000.

Its unique versatility means it can be expanded by the addition of autodial and autoanswer options (presently undergoing approval testing with BABT), plus direct computer software control of the modem and much more.

**Service** – A large dealer/distributor network both in the UK and abroad means you're never far from a WS2000 stockist.

And our Customer Service and Technical Departments are happy to give help and advice.

**The Experts** – Thousands of users depend on WS2000 – local authorities, government departments, multi-nationals,

private companies and individuals.

WS2000 is the modem chosen by the BBC to demonstrate a UK-USA datalink live on TV; selected by Cable & Wireless/Western Union for their Easylink Telex Service; taken

round the world on Operation Raleigh; in action for CBS News, sending front-line war reports around the world.

WS2000 is the modem used by people who need reliable data communications today – and every day.

WS2000, with BT telephone lead, mains power supply and comprehensive operating manual costs only **£129.95 exc.** (£154.73 inc. VAT & UK delivery) – you may also need a computer lead (£10.35 inc.) – specify computer when ordering.

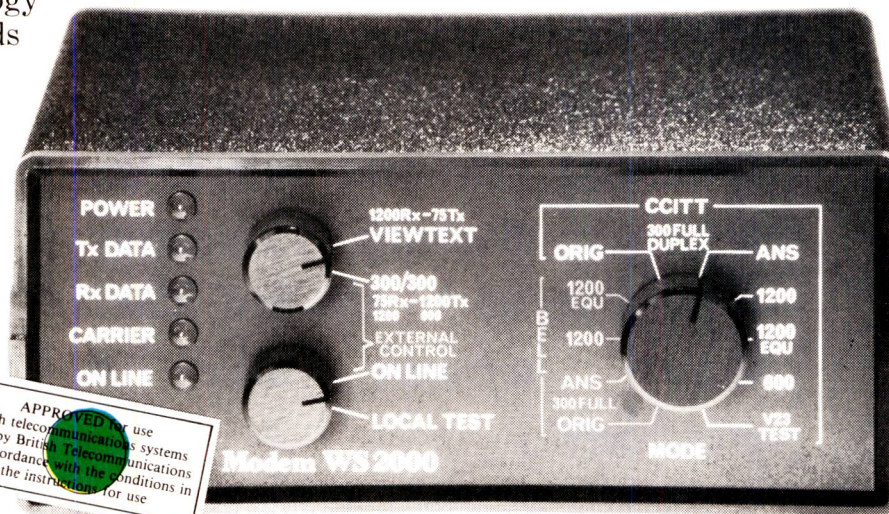
A small price to pay for survival.

Order by cheque/Visa/Access/Trade or official order to:

Miracle Technology (UK) Ltd,  
St Peters Street, Ipswich IP1 1XB.

☎ 0473 50304 ☒ 946240 CWEASY G 19002985

**MIRACLE TECHNOLOGY**  
we thought of tomorrow, yesterday.





# FORTH = TOTAL CONTROL

**FORTH** programs are instantly portable across the most popular microprocessors.

**FORTH** is interactive and very fast.

**FORTH** programs are structured, modular, and easy to maintain.

**FORTH** gives control of all interrupts, memory locations, and i/o ports.

**FORTH** gives full access to DOS files and functions.

**FORTH** application programs can be converted to turnkey programs.

**FORTH** Cross Compilers can generate ROMmable code for: 6502, 6809, 68000, 8080, Z80, 8086, 6800, 6801/3, 1802, Z8, 8070, Z8000, 99xxx, LSI-11

We are the **FORTH** specialists, we also stock a large range of books, listings, and implementations for machines ranging from Spectrums to Macintosh to VAX.

**mpe MicroProcessor Engineering Ltd**  
21 Hanley Road, Shirley  
Southampton SO1 5AP  
Tel: 0703 780084

**Application Development Systems** include **FORTH** with virtual memory, multi-tasking, assembler, full-screen editor, decompiler, utilities, and full documentation.

**LMI Z80 FORTH** - CPM 2.2 £95  
**LMI 8086 FORTH** - CPM-86, MSDOS £110  
**LMI PC/FORTH** - PC/DOS £110  
**MPE-FORTH 6809** - FLEX, OS9 £175  
**LMI 68000 FORTH** - CPM 68K £225

**FORTH+** has 32-bit stacks and directly accesses the whole address space of the processor.

**PC FORTH+** £225  
**8086 FORTH+** £225  
**68000 FORTH+** £225

**Extension Packages** include floating point, cross compilers, 8087 support, colour graphics, interactive debuggers

PRINT-SP

ROM 81

PROMER 81 S

MULTEPROM

BLOPROM-SP

DHOB1

NIKE

MEMIC-81

Cambridge Microelectronics Ltd.

## CAMEL PRODUCTS

### NEW POLYPRINT for Spectrum

... The interface which likes to say ... Ja and Oui and Si and of course YES! A Spectrum Centronics interface unit with up to 8 sets of characters displayed on screen, as per international set in EPSON FX80 printer. Printer driver also in EPROM.

**POLYPRINT** from Silicon City £44.95

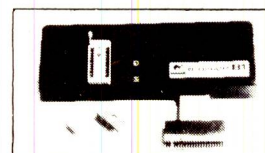
### EPROM PROGRAMMERS

#### BLOPROM-SP A uniquely sophisticated EPROM PROGRAMMER

Eprom programmer for the 2516, 2716/32/32A/64/64A/28/128A, yes even the 64A/128A from Intel. Check, Read, Program & Verify all or part of Eprom.

So immensely user friendly you'll hardly need the manual. Designed for the beginner but includes a single key entry route for the professional. Supplied as firmware, the m/c driver routine alone is worth more than the price of BLOPROM-SP. No Personality Cards, or other additions, just a Spectrum. Several inbuilt safety features. On-board Vpp generation. 28pin ZIF socket. Cabled connector and extender plug. ABS case. £89.95

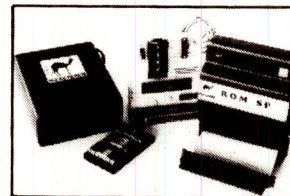
**AT LAST!** for the Spectrum user. Put your programs, utilities, Assemblers into EPROMS for instant load from the unique ROM-SP



STATUS NO. OF SYSTEM —HEX  
EPROM TYPE —27128  
RAM START ADDR —4000  
EPROM ST. ADDR —0000  
JOB LENGTH —4000  
TASK —CHECK

WHICH TASK DO YOU WISH TO DO  
W) CHECK THAT EPROM IS CLEAN  
X) READ THE CONTENTS OF EPROM INTO RAM  
Y) BLOW AN EPROM WITH DATA FROM RAM  
Z) VERIFY THAT EPROM DATA IS THE SAME AS IN RAM  
Q TO QUIT R TO RESTART

FAST CODES AVAILABLE  
D H POR WXYZ



#### ROM-SP

Ingenious unit for Spectrum, with 2x28 pin sockets and a Reset button allows up to 16K of Basic or M/C program to RUN or LOAD instantly from EPROMS. Cabled connector and full extender card. NOTE: Does not disable Sinclair ROM. £29.95

2764's at £5.50, 27128's at £8.50 x VAT

#### PROMER-SP

A brand new Spectrum programmer for 2764/128. Zero insertion force socket & software on tape. £29.95

#### PROMER 81-S

The very popular PROMER-81 for the ZX81 has been adapted to the Spectrum and the price kept low. £24.95

#### ROM-81

Provides two 24 pin sockets for up to 8K of EPROM memory in the 8-16K area. Can use 2516/32 or 2716/32 £14.95

#### PROMER-81

A low cost reliable programmer for 2516/32, 2716/32 EPROMS. Requires 4xPP3 batteries £24.95

#### DHOB1 1

Compact. Mains powered. Safe. Fully cased. Up to 3 EPROMS

#### UV ERASER

£18.95

#### DHOB1 2 With automatic timer

£22.95

#### CRAMIC-SP

Ingenious software paged 16K non-volatile CMOS RAM to co-exist in the same area as Spectrum ROM. Easy storage and retrieval of BASIC, M/C or DATA on a 48K Spectrum £89.95

#### PRINT-SP

Centronics Interface with standard centronics Cable. Software on tape. See also Polyprint £31.25

### NIKE POWER BUFFERS

for Spectrum, Atmos, ZX81

£17.35

#### DREAM-81

64K Rampack with link options to disable 0-8-16K. Plus a 28 pin EPROM socket for 2716, 2732/2764 and 27128. £59.95

#### MEMIC-81

4K CMOS RAM with lithium battery. Easy SAVEing, 10yr storage and instant retrieval of programs. £29.95



UK. VAT extra. No VAT on exports P+P UK Free  
Europe +5% — Overseas +10% TLX 81574 CML  
Cambridge Microelectronics. One Milton Road.

Cambridge Microelectronics Ltd. One Milton Rd. Cambridge CB4 1UY.

Tel: (0223) 314814

PROMER 81

P10 81

NIKE

P10 SP

MEMIC

CRAMIC-SP

ROM SP

CRAMIC 81

POLYPRINT

PROMER SP



## Enter the Communications Era It's high time you used your microcomputer to communicate with the rest of the World.

**FREE**

subscription to B.T. Gold or One To One electronic mail service, with every one of our MODEMS and TERMINALS.

Send for further information:

- ☐ MODEMS from £89
- ☐ Portable Terminals for Telex/Electronic Mail, from £220
- ☐ Communications software for your computer, from £50
- ☐ Printers, from £150

- ☐ Mobile Telephone (Cellular), from £1375
- ☐ Switch Boxes for sharing peripherals, from £65
- ☐ Interface Cables, from £2
- ☐ Interface Breakout boxes, from £75
- ☐ Third Party Maintenance

★ National Service Back-up

★ Over 5 years in the Professional Electronics Industry

★ Specialist Dealer/Broker

Sales Department

## DELARIESE ENTERPRISES

40B Wilton Road, Reading, Berks, RG3 2SS

Tel: (0734) 591091 Telex: 848072 SBPNEU

Name .....  
Department .....  
Position .....  
Company .....  
Address .....  
Tel..... Telex: .....

PCW/6/85



# Thinking so ... thi

## THE TASWORD WORD PROCESSORS

The extensive features of the Tasword word processors are ideal for both the home and business user. Every Tasword comes complete with a comprehensive manual and a cassette or disc. The cassette or disc contains your TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD. Whether you have serious applications or simply want to learn about word processing, TASWORD and TASWORD TUTOR make it easy and enjoyable.

### TASWORD TWO (Spectrum)

#### 64 characters per line on the screen!

*"Without doubt, the best utility I have reviewed for the Spectrum."* HOME COMPUTING WEEKLY APRIL 1984

*"If you have been looking for a word processor, then look no further."* CRASH JUNE 1984

The cassette program is supplied with instructions for microdrive conversion.

TASWORD TWO\* ZX 48K Spectrum  
cassette **£13.90**  
microdrive cartridge **£15.40**

### TASWORD 464

*"There is no better justification for buying a 464 than this program."*

POPULAR COMPUTING WEEKLY NOVEMBER 1984

A particularly sophisticated yet easy to use program. Now available on disc. The cassette version is supplied with instructions for transferring to disc.

TASWORD 464\* Amstrad CPC 464  
cassette **£19.95**  
disc **£22.95**

### TASWORD EINSTEIN

A sixty-four character per line display and the ability to hold over five hundred lines of text at any time are just some of the features of this, the most recent, of the Taswords. Full interaction with the disc system – e.g. Tasword detects the presence of added drives and allows their use.

TASWORD EINSTEIN Tatung Einstein  
disc **£19.95**

### TASWORD MSX

With all the features of the Spectrum Tasword Two including the amazing sixty four character per line display. The Tasword MSX machine code program utilises the 32K of memory not normally available to Basic allowing over five hundred lines of text to be held in memory.

TASWORD MSX\* 64K MSX Computers  
Fully inclusive mail order price **£13.90**  
(cassette/ includes both disc and tape versions)

## THE TASCOPY SCREEN COPIERS

The TASCOPY screen copiers print high resolution screen copies with different dot densities and patterns for the various screen colours. This gives the screen copies a shaded effect which presents on a monochrome scale the colours on the screen. With TASCOPY you can keep a permanent and impressive record of your screen pictures and diagrams. TASCOPY supports all the printers mentioned under TASPRIINT.

### TASCOPY (Spectrum + Interface 1)

The Spectrum TASCOPY is for use with the RS232 output on ZX Interface 1. It produces monochrome copies (in a choice of two sizes) as well as copies with the shaded 'grey scale' effect described above.

TASCOPY ZX Spectrum cassette **£9.90**  
microdrive cartridge **£11.40**

### TASCOPY 464

Adds two new commands to the 464 Basic to give both a standard shaded screen copy as well as a 'poster size' copy which is printed onto two or four sheets which can be cut and joined to make the poster.

TASCOPY 464 Amstrad CPC 464 cassette **£9.90**  
disc **£12.90**

### TASCOPY QL

TASCOPY QL adds new commands to QL Superbasic. Execute these commands to print a shaded copy of the screen contents. Print the entire screen or just a specified window. TASCOPY QL also produces large 'poster size' screen copies on more than one sheet of paper which can then be cut and joined to make the poster, and high speed small copies.

TASCOPY QL Sinclair QL  
microdrive cartridge **£12.90**

## THE TASPRIINT STYLE WRITERS

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. The Taspriints utilise the graphics capabilities of dot matrix printers to form, with a double pass of the printhead, output in a range of five fonts varying from the futuristic data-run to the hand writing simulation of Palace Script. A TASPRIINT gives your output originality and style! The TASPRIINTS drive all Epson compatible eight pin dot-matrix printers, e.g.

AMSTRAD DMP 1  
EPSON FX-80  
EPSON RX-80  
EPSON MX-80 TYPE III  
NEC PC-8023B-N

MANNESMANN TALLY MT-80  
STAR DMP 501/515  
BROTHER HR5  
SHINWA CP-80  
COSMOS-80  
DATAC PANTHER  
DATAC PANTHER II

Five impressive print styles for your use:-

**COMPACTA** - bold and heavy, good for emphasis  
**DATA-RUN** - A FUTURAISTIC SCRIPT  
**LECTURA** - clean and pleasing to read  
**MEDIAN** - a serious business-like script  
**Palace Script** - a distinctive flowing font

Typical Taspriint output. Please note that different makes of printer produce different sized output.

### TASPRIINT (Spectrum)

Drives all the printer interfaces compatible with TASWORD TWO and can be used to print TASWORD TWO text files as well as output from your own Basic programs.

TASPRIINT 48K Spectrum cassette **£9.90**  
microdrive cartridge **£11.40**

### TASPRIINT 464

Can be used to print AMSWORD/TASWORD 464 text files in addition to output from your own Basic programs. Drives the Amstrad DMP 1 in addition to the printers listed to the left.

TASPRIINT 464 Amstrad CPC 464 cassette **£9.90**  
disc **£12.90**

### TASPRIINT QL

TASPRIINT QL includes a screen editor used to modify files created by other commercial software, such as QUILL, or by the user from BASIC. These modified files include TASPRIINT control characters and may be printed, using TASPRIINT, in one or more of the unique TASPRIINT fonts.

TASPRIINT QL Sinclair QL  
microdrive cartridge **£19.95**



# ftware?...

# nk Tasman

**OTHER TASMAN PRODUCTS  
FOR THE ZX SPECTRUM**

**TASMERGE**

**The Mail Merger**

Transfer data from MASTERFILE to TASWORD TWO! Letters and forms typed on TASWORD TWO can be printed with addresses and data taken from MASTERFILE. The mail merge facility allows, for example, multiple copies of a letter to be printed, each containing a different name and address taken from your MASTERFILE data. To use TASMERGE you must have one or more microdrives as well as TASWORD TWO and MASTERFILE by Campbell Systems. (version 9 or later).

TASMERGE ZX 48K Spectrum **£10.90**

**TASWIDE**

**The Screen Stretcher**

With this machine code utility you can write your own Basic programs that will, with normal PRINT statements, print onto the screen in the compact lettering used by TASWORD TWO. With TASWIDE you can double the information shown on the screen!

TASWIDE ZX 16K + 48k Spectrum **£5.50**

**TASMAN PRINTER INTERFACE**

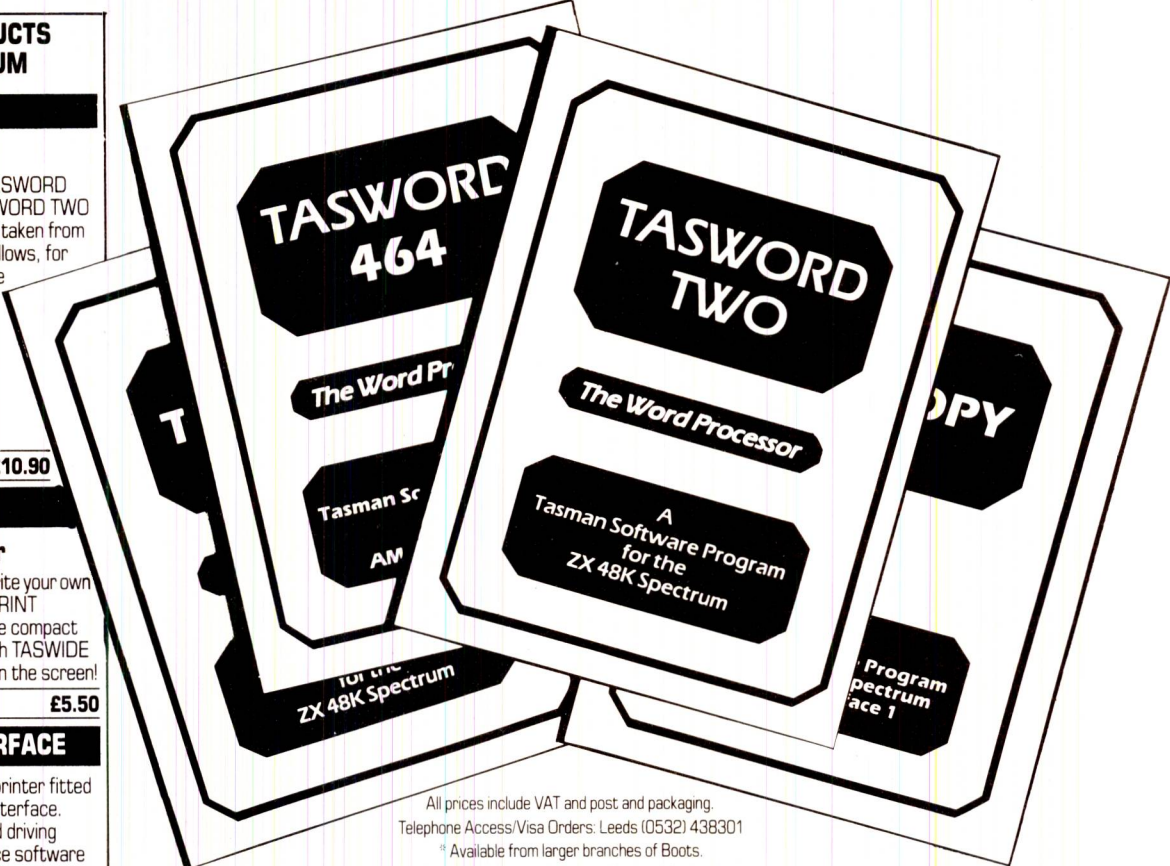
Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable and driving software. The user changeable interface software makes it easy to send control codes to your printer using the method so successfully pioneered with TASWORD TWO. The cassette contains fast machine code high resolution full width SCREEN COPY SOFTWARE for Epson, Mannesmann Tally, Shinwa, Star, and Tandy Colour Graphic (in colour!) printers.

TASCOPY, shaded screen copy software for this interface (value £9.90 – see description on left) is included in this package.

CENTRONICS INTERFACE ZX Spectrum **£39.90**

**COMPUTER PRINTER CABLES**

RS232 for ZX INTERFACE 1 **£14.50**  
MSX CENTRONICS **£16.00**  
AMSTRAD CPC 464 CENTRONICS **£9.90**



All prices include VAT and post and packaging.  
Telephone Access/Visa Orders: Leeds (0532) 438301  
\* Available from larger branches of Boots.  
QL is a trademark of Sinclair Research Limited.

Available from good software stockists and direct from:

# Tasman

SOFTWARE

Springfield House, Hyde Terrace, Leeds LS2 9LN. Tel: (0532) 438301

If you do not want to cut this magazine just write your order and post to:

TASMAN SOFTWARE, Dept. YC, Springfield House,  
Hyde Terrace, Leeds LS2 9LN.

I enclose a cheque/P.O. made payable to Tasman Software Ltd.  
OR charge my ACCESS or VISA number

No. \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

COMPUTER	ITEM	PRICE
		£ _____
		£ _____
		£ _____
Outside Europe add £1 for each item airmail £ _____		TOTAL £ _____

Send me the FREE Tasman brochure describing your products: tick here: ☐

I would like to know more about your programs for:

QL ☐ Tatung Einstein ☐ ZX Spectrum ☐ MSX ☐ Amstrad CPC 464 ☐



# ANCHORLORD LTD.

## MICROS

SINCLAIR SPECTRUM	£125
COMMODORE 64	£245
ACORN BBC B	£125
AMSTRAD CPC 464	£245
MSX GOLDSTAR	£250
SANYO MSX	£250

**10 C5'S  
TO BE WON!  
GAMES + GAMES  
+ GAMES!!**

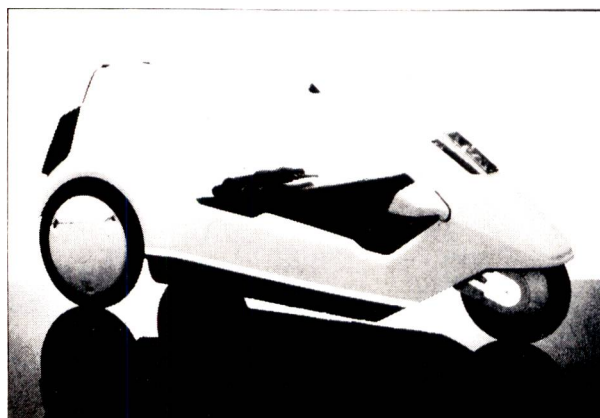
**FOR EVERY £30  
YOU SPEND WITH US,  
YOU HAVE THE CHANCE TO WIN  
A SINCLAIR C5!!\***

Every 100th customer drawn from our hat  
will win a Sinclair C5. All runners up  
will receive a free game!

\* Spend £150 and have  
5 chances to win.  
Spend £300 and you  
have 10 chances to win!

## MONITORS

QL	£220
PHILIPS	£74
COMMODORE	£200



## PRINTERS

EPSON RX80 F/T	£240
BROTHER EP44	£220
STAR GEMINI 10X	P.O.A.
COMMODORE	£300

## PERIPHERALS

SPECTRAVIDEO'S QUICKSHOT	
JOYSTICK	£10
KEMPSTON PRO JOYSTICK	£10
SINCLAIR INTERFACE	£45

## SOFTWARE

CBS IMPOSSIBLE MISSION	£8
FLIGHT SIMULATOR II	£10
DARK STAR	£8
BOULDER DASH	£8
TASWORD II	£12
FOOTBALL MANAGER	£8
INTERNATIONAL SOCCER	£8
POLE POSITION	£8

**ANCHORLORD LTD.**

OVERSEAS ENQUIRIES WELCOMED

THE INTERNATIONAL BUSINESS CENTRE, 29 GLASSHOUSE STREET, LONDON W1  
OR TELEPHONE: 01-734 6080



# ATARI 600XL ENTERTAINMENT PACK

Great news for games addicts who appreciate high quality graphics and sensational arcade action gameplay. For Only £69, you can buy a 16K Atari 600XL Computer with two top arcade ROM cartridge titles and a joystick. These two ROM titles are the famous arcade hit Donkey Kong and another favourite Qix (We only have a limited number of packs with Qix. When these run out, Qix may be substituted for an arcade entertainment cartridge of the same value). The 600XL Entertainment Pack offers real value for money and enables you to save £63.96, nearly half of the normal RRP's of the pack items when purchased individually. Silica Shop have a wide range of ROM cartridges available including arcade favourites such as Asteroids, Centipede, Missile Command, Popeye, Q\*Bert, Star Raiders, Super Cobra for only £9.95 each! The 600XL is a programmable home computer with the Basic Programming Language built in and if you later add a 1010 Program Recorder (XLP 1010 - £34), a range of hundreds of cassette programs will become available to you. The Atari 600XL is recommended as a first class games machine.

**ATARI PACKS - POWER WITHOUT THE PRICE!**



ATARI 600XL ENTERTAINMENT PACK	
16K Atari 600XL .....	£99.99
Donkey Kong (R) .....	£14.99
Qix (R) .....	£9.99
Single CX40 Joystick .....	£7.99
Total (if purchased separately) .....	<b>£132.96</b>
Less Discount (approx 48.1%) .....	<b>£63.96</b>
<b>PACKAGE PRICE (XLC 1600) ..</b>	<b>£69.00</b>

## £69

# ATARI 800XL AND RECORDER PACK

The 64K 800XL is packaged here with the 1010 recorder, an economical storage and retrieval unit, a smash hit arcade game and programming aid, all for a package price of only £129 (ref: XLC 1010), a saving of £65.96 off the RRP's of the individual items which total £194.96. The game included in this pack is Pole Position. Now on cassette from Atari, Pole Position is an accurate reproduction of Atari's own highly successful arcade driving game which has all the thrills and spills of the grand-prix racetrack. On the reverse of this cassette is a demonstration program of Atari's amazing sound and graphics capabilities giving an example of the high quality performance of the Atari 800XL. Also included is an Invitation to Programming 1 cassette which takes you step by step through the first stages of programming in Atari Basic using Atari's unique soundthrough facility which allows pre-recorded human speech to be played through your TV speaker. All you need is a joystick (ATJ 0400 - £7.99 for Pole Position), to be up and running with this package. The Atari 800XL in this pack comes with a Silica two year guarantee.

**ATARI PACKS - POWER WITHOUT THE PRICE!**



ATARI 800XL + PROG. RECORDER PACK	
64K Atari 800XL .....	£129.99
1010 Program Recorder .....	£34.99
Pole Position + Demo Prog (C) ..	£9.99
Invitation to Programming 1 .....	£19.99
Total (if purchased separately) .....	<b>£194.96</b>
Less Discount (approx 33.8%) .....	<b>£65.96</b>
<b>PACKAGE PRICE (XLC 1010) ..</b>	<b>£129.00</b>

## £129

# ATARI 800XL AND DISK DRIVE PACK

This pack includes the 64K 800XL with a 1050 Disk Drive for mass storage and speedy information retrieval as well as a brand new adventure game and a powerful home help program, all for only £249 (ref: XLC 1050), a saving of £115.96 off the RRP's of the individual items which total £364.96. The first of these programs is The Payoff on disk, a new adventure game which is a fantasy simulation in which you play the leading role. An exciting introduction to adventure programs which are always popular (with a demonstration program of Atari's amazing sound and graphics on the reverse). Also included in this pack is Home Filing Manager to help you organise your files. It allows you to catalogue and file details of birthdays, books, your stamp collection or anything else which would normally require you to use filing cards. The instructions for Home Filing Manager are on the reverse of the disk and all the disks which come in this package are in protective paper wallets. You get an extended two year guarantee on the 800XL and 100 free programs with the disk drive when you buy this package from Silica.

**ATARI PACKS - POWER WITHOUT THE PRICE!**



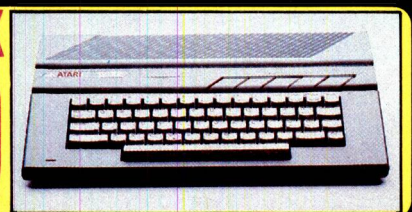
ATARI 800XL + DISK DRIVE PACK	
64K Atari 800XL .....	£129.99
1050 Disk Drive .....	£199.99
Home Filing Manager (D) .....	£24.99
The Payoff + Demo Prog (D) .....	£9.99
Total (if purchased separately) .....	<b>£364.96</b>
Less Discount (approx 31.8%) .....	<b>£115.96</b>
<b>PACKAGE PRICE (XLC 1050) ..</b>	<b>£249.00</b>

## £269

# NEW ATARI 130XE NOW IN STOCK

Atari's new 128K computer, the Atari 130XE offers an enormous 131,072 bytes of RAM for only £169. The 130XE comes with built in Basic and full operating instructions and is now in a newly designed case with a modern full stroke keyboard. The XE is fully compatible with both the 400/800 and the XL ranges of machines, this means that it can run approximately 90% of all Atari Computer software on the market. This provides a range of over 1,000 software titles as well as a large selection of accessory and peripheral items. Initial stock of the 130XE will be limited, so it's first come first served.

## £169



## SILICA SHOP

**WE ARE THE UK'S No1 ATARI SPECIALISTS**  
Since the introduction of Atari Video Games into the UK six years ago, Silica Shop has been selling Atari products and supporting Atari owners with a specialist mailing service which we believe is unbeatable. We stock over 1,000 Atari related product lines and have a mailing list including over 300,000 Atari 2600 VCS owners and over 50,000 Atari Home Computer Owners. Because we specialise in Atari, we aim to keep stocks of all the available Atari hardware, software, peripherals and accessories. We also stock a wide range of Atari dedicated books and through us, the owners on our list can subscribe to several American Atari dedicated magazines. We can provide a full service to all Atari owners and are now firmly established as the UK's NUMBER ONE Atari specialists. Here are just some of the things we can offer you:

**FREE POST & PACKING ON MAIL ORDERS**  
**FREE CLUBS & INFORMATION SERVICE**  
**HIGHLY COMPETITIVE PRICES**  
**AFTER SALES SUPPORT SERVICE**  
**REPAIR SERVICE ON ATARI PRODUCTS**

If you would like to register on our mailing list as an Atari computer owner, or just because you are interested in buying an Atari machine, let us know. We will be pleased to keep you up to date with all new developments on the Atari scene free of charge. So, post off the coupon with your order or enquiry and begin experiencing an Atari service that is second to none.

**01-309 1111**

**SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Tel: 01-309 1111**  
**ORDER NOW-OR SEND FOR OUR FREE ATARI BROCHURES**

To: SILICA SHOP LTD, Dept PCW 0685, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Telephone: 01-309 1111

### LITERATURE REQUEST:

- ☐ Please send me your FREE brochures on Atari Home Computers.  
☐ I already own a ..... Videogame ☐ I already own a ..... Computer

Mr/Mrs/Ms: ..... Initials: ..... Surname: .....  
Address: .....  
Postcode: .....

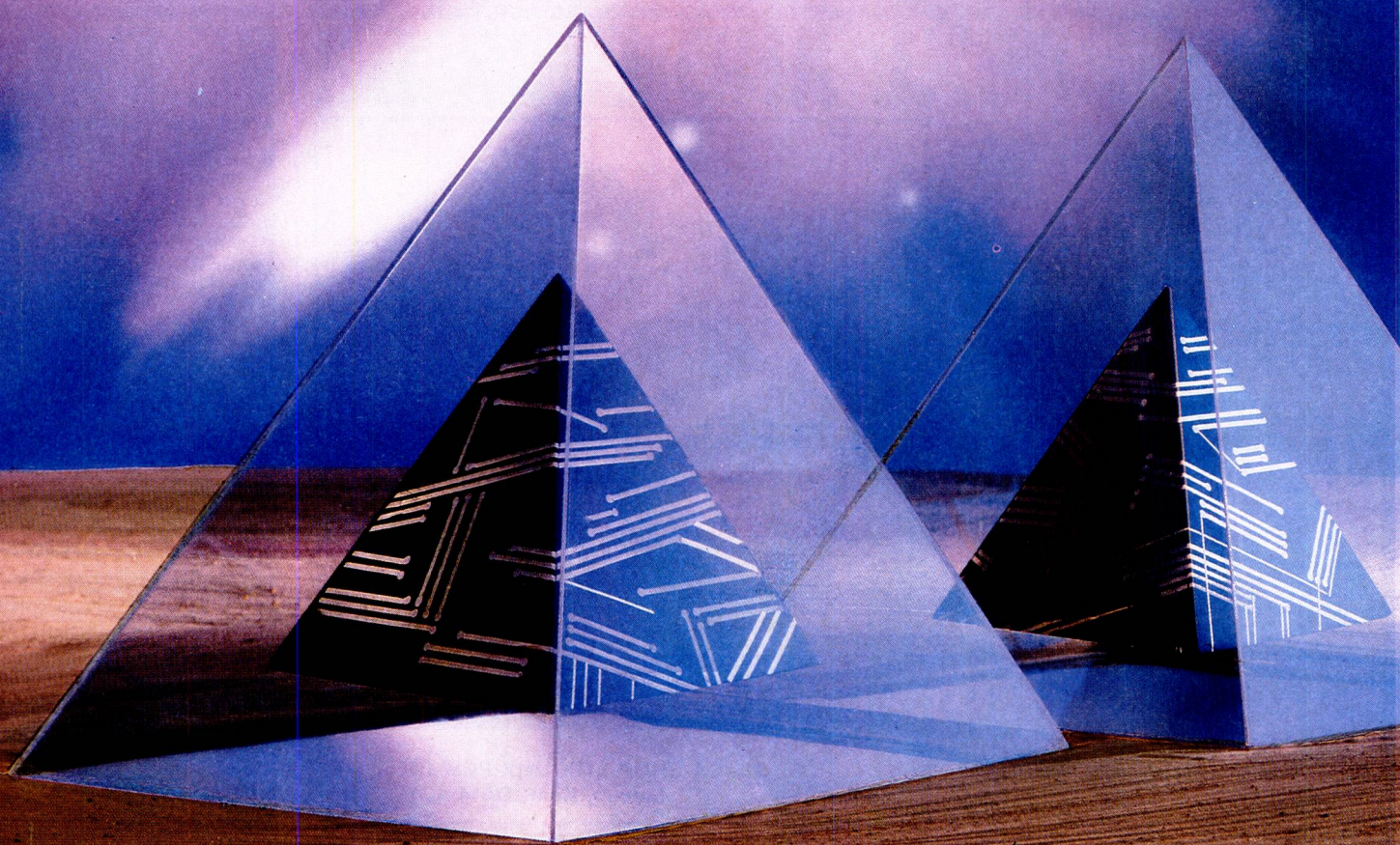
### ORDER REQUEST:

- PLEASE SEND ME:**
- |                                                                 |      |                               |
|-----------------------------------------------------------------|------|-------------------------------|
| <input type="checkbox"/> 16K 600XL Entertainment Pack .....     | £69  | <i>All prices include VAT</i> |
| <input type="checkbox"/> 64K 800XL & 1010 Recorder Pack .....   | £129 |                               |
| <input type="checkbox"/> 64K 800XL & 1050 Disk Drive Pack ..... | £249 |                               |
| <input type="checkbox"/> 128K 130XE Home Computer .....         | £169 |                               |
- Post & Packing is Free Of Charge*
- ☐ I enclose Cheque/P.O. payable to Silica Shop Limited for the following amount: £ .....
- ☐ CREDIT CARD - Please debit my:  
Access/Barclaycard/Visa/American Express/Diners Club My Card No is: .....





# RPS MEMORY T



"Lots of people are talking about RPS these days."  
"Why – there are 100 other brands of floppy discs to choose from."

"Yes – but how many companies are actual manufacturers and how many totally control the production of their discs – from the base film to the crucial magnetic coating?"  
"Only a handful."

"How many have the technology to produce the new generation

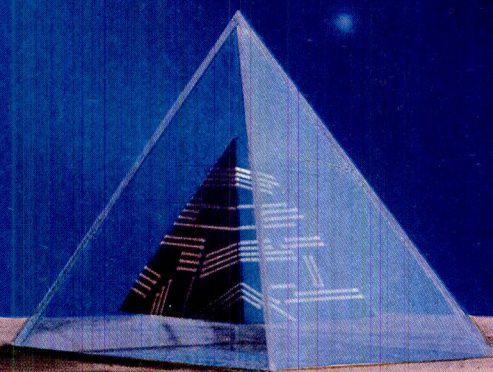


of high density five and a quarter inch and micro-floppy discs?". We feel one can answer:

"Only one outside Japan – RPS". As the specialist computer media division of Rhone-Poulenc (one of Europe's largest chemical and pharmaceutical groups) RPS is already a world leader in coating technology and makes the most reliable discs, computer tapes and disc packs on the market.



# WHAT IS FOREVER



Now with its acquisition of Brown Disc, America's number one producer of high density floppies, RPS offers the most complete range of advanced storage products anywhere.



RPS is committed to staying at the forefront of the computer media business. That means you'll still be hearing about RPS long after most of the other 100 have disappeared.

Rhône-Poulenc Systems - High Street, Houghton Regis, Bedfordshire, LU55QL - Tel.: Dunstable (0582) 605551

# RPS

A DIVISION OF THE RHÔNE-POULENC GROUP

## The professional computer memory.



## ORIC AND SINCLAIR COMPUTERS



Oric 1 computer 48K £75 (£72) £82. Oric Atmos computer 48K £110 (£108) £118. CCP40 Oric printer/plotter £94 (£95) £99. Sinclair pocket TV £97 (£95) £101. Sinclair QL Computer £379 (£378) £399. QL Floppy disc interface £107 (£103) £109. Sinclair Spectrum Plus Computer 48K £127 (£129) £149. Kit to upgrade the Spectrum to Spectrum Plus £30 (£30) £40. Microdrive £49 (£50) £60. RS232 interface 1 £49 (£50) £60. Special offer: Microdrive + Interface 1 + 4 cartridges £97 (£99) £107. Blank microdrive cartridges £2.50 (£3) £4. Spectrum floppy disk interface (See Cumana disk section for suitable disk drives) £97 (£89) £99. Interface 2 £20.45 (£20) £24. 32K memory upgrade kit for 16K Spectrum (issue 2 and 3 only) £31 (£28) £30. Spectrum Centronics printer interface £46 (£42) £47. ZX printer has been replaced by the Alphacom 32 £71 (£59) £82. 5 printer rolls (State whether Sinclair or Alphacom) £13 (£16) £21. ZX81 computer £35 (£35) £45. 16K ram packs for Z81 £28 (£25) £30.

## COMMODORE COMPUTERS

Commodore C16 Starter Pack £119 (£119) £151. Commodore Plus/4 £147 (£142) £174. Commodore 64 £189 (£194) £226. Converter to allow most ordinary mono cassette recorders to be used with the Vic 20 and the Commodore 64 £9.78 (£9) £11. Commodore cassette recorder £43 (£44) £50. Printer interfaces for Vic 20 and the Commodore 64: Centronics £45 (£41) £46. RS232 £45 (£41) £46. Disk drive £197 (£201) £232. 1520 printer/plotter £99 (£96) £111. MPS801 Printer £189 (£191) £229.

## ACORN COMPUTERS

Acorn Electron £119 (£119) £139. BBC Model B £354 (£343) £383. BBC Model B with disk interface £474 (£461) £491. Colour monitor £188 (£228) £268. Kenda double density disk interface system £137 (£131) £141. See below for suitable disk drives.

## AMSTRAD, ATARI, ENTERPRISE AND MSX COMPUTERS

Amstrad colour computer £342 (£348) £388. Amstrad green computer £232 (£247) £287. Atari 800XL computer £129 (£135) £150. Atari data recorder £34 (£37) £47. Atari disk drive £186 (£189) £209. Atari 1020 printer £93 (£99) £115. Enterprise 64 computer £234 (£236) £256. MSX Goldstar computer £203 (£193) £213.

## CUMANA DISK DRIVES

To suit disk interfaces of Sinclair QL, Spectrum, and BBC B. Single: 40 track single sided £164 (£163) £183. 40 tr double sided £169 (£168) £188. 80 tr ss £219 (£209) £229. Dual: 40 tr ss £294 (£280) £320. 40 tr ds £325 (£325) £365. 80 tr ds £414 (£390) £430.

## PRINTERS



CCP40.4 colour printer/plotter £94 (£95) £99. Brother HR5 £162 (£161) £193. Shinwa CT1 CP80: centronics parallel version £218 (£222) £258. RS232 version £238 (£240) £282. Cannon PW1080A £305 (£301) £352. Epson RX80 £249 (£249) £282. Epson RX80F/T+ £283 (£281) £316. Epson FX80 £339 (£305) £335. Combined matrix printers and electric typewriters: Brother EP22 £145 (£134) £154. Brother EP44 £230 (£226) £246.

## BUSINESS COMPUTERS

Epson PX8 £900 (£872) £892. Commodore PC £1595 (£1564) £1664. Sanyo MBC 775 £1920 (£1899) £1999. Cannon A200C £1609 (£1586) £1686. Sanyo MBC550 £723 (£699) £799.

## SWANLEY ELECTRONICS

The Computer Export Specialists  
Dept PCW, 32 Goldsel Rd, Swanley, Kent BR8 8EZ,  
England

Tel: SWANLEY (0322) 64851. Official orders welcome. UK prices are shown first and include post and VAT. The second price in brackets is for export customers in Europe and includes insured airmail postage. The third price is for export customers outside Europe (including Australia etc) and includes insured airmail postage.

## NOW TURBO PASCAL FOR THE APPLE II, IIe, IIc

Turbo Pascal ..... 49  
Turbo Pascal (Isam, Quick-sort etc) ..... 49  
Turbo Tutor ..... 29  
Gift Pack Special: All the above with Z80 card ..... 135

These require  
CP/M

## FOR THE APPLE



Parallel Printer card with cable ..... 49  
Eprom Programmer ..... 55  
Z80 card ..... 45  
IIe 80 column card ..... 50  
IIe 80 column + 64K ..... 90

## TELECOM GOLD

PHONE FOR DETAILS  
OF FREE MAIL BOX



## Weirlord Limited Software Systems Consultants

Weirlord Ltd have over seven years' experience developing **REAL-TIME, TECHNICAL, GRAPHICS** and **INDUSTRIAL** systems. We can take your project from **CONSULTANCY** right through to **IMPLEMENTATION**. Let us meet your computer-based requirements with the high performance, cost-effective proven **STRIDE(SAGE)** range of computers.

We offer solutions mainly based in the following environments:

**UNIX/IDRIS** AT&T operating system  
**CP/M-68K** Very fast and compact CP/M under the MC68000  
**UCSD p-System** User friendly truly portable operating system  
(OTHERS considered . . .)

We work in and sell the following languages:

**ADA** Fully US DOD validated  
**C** UNIX and CP/M-68K standard language  
**FORTRAN 77** Scientific language on UNIX, CP/M-68K & UCSD p-System  
**LISP** A.I. string based language under UNIX and CP/M-68K  
**MODULA 2** Real time systems language under CP/M-68K and p-System  
**OCCAM** First truly parallel language for use on TRANSPUTER  
**PASCAL** Structured language under UNIX, CP/M-68K & UCSD p-System  
**Assemblers** Most microprocessors catered for

**FOR YOUR TECHNICAL SOLUTIONS RING: 0705 828035**

WEIRLORD LTD, 117 Victory House, Somers Road North,  
PORTSMOUTH, Hants PO1 1PJ

## SANYO 550 now IBM PC Compatible

IBM/Lotus Video Board 145 Video Board and Lotus 123 (req 256k) 445

## SANYO 550 Series

Memory Upgrades 64k (128-192k) 49	Graphic Specials:
128k (128-256k) 90	(Grafiti: Freeze Frame: Joystick) 85
Disk Upgrades 2x360k Internal 315	(Picasso: Freeze Frame: Joystick) 118
(All inc 2x800k Internal 355	BASIC Manual 27
Software 2x800k External 429	Joystick (2 Button) with ext Cable 25
10mb Internal Hard Disk 995	Logitek Screen Handler (Ansi 3.64) 15
MS-DOS 2.11 39	Screen Dump (Freeze Frame) 32
Games/Business Send for list	Select — Datastar: Report/Label Pgm 25
Desmet 'C' and 8088 Assembler 155	

## IBM PC

20mb Internal Hard Disk 1095	Memory Upgrades 64k RAM 55
Hard Disk Power Supply (Optional) 145	128k RAM 99
24mb Tape Streamer (No slot req) 975	AST Six Pack Plus Multifunction Card
AutoCAD (Draft/Design Package) 1000	(RAM:Serial:Parallel:Clock)
smARTWORK (PCB Design Package) 895	AST with 64k RAM 295
	AST with 384k RAM (Huge Saving) 495

## 5 1/4" FLOPPY DISKS — BASF or 3M

Single Sided: Single Density (per 10) 16	Double Sided: Double Density (per 10) 21
Single Sided: Single Density (per 50) 70	Double Sided: Double Density (per 50) 99

All prices plus VAT at 15%. FREE Postage & Packing. Manufacturers Guarantees.

Send cheque with order to:

## NORTH WEST COMPUTER SUPPLIES

19 Green Pastures, Stockport, Cheshire SK4 3RB

Tel: (061) 432 2952 or (0606) 781164

Callers by appointment ONLY





# SOFTWARE CENTRE

**CP/M**

**CP/M-86**

**MSDOS**

## MICROPRO SOFTWARE SYSTEM

**WORDSTAR:** Best selling professional Word Processing software: On screen formatting, Block manipulation, File read/write, Simultaneous Editing and Printing ..... **£295**  
**MAILMERGE:** Enhancement for document personalisation and mailing applications ..... **£145**  
**SPELLSTAR:** Enhancement for checking spelling and maintaining spelling dictionaries ..... **£145**  
**STARINDEX:** Useful package for creation of Table of Contents, Index, List of Figures. Interfaces to Wordstar to improve document presentation quickly and easily ..... **£116**  
**INFOSTAR:** Impressive Data Base system combining the power of Datastar with the flexibility of Reportstar ..... **£295**  
**DATASTAR:** Screen based Data Entry, vetting and retrieval system. Screen formats under user control ..... **£175**  
**REPORTSTAR:** Powerful report generator, provides much needed enhancement to Datastar for report production and transaction processing ..... **£210**  
**CALCSTAR:** Electronic spreadsheet with interfaces to all MicroPro products ..... **£116**

**WORDSTAR 2000:** For the IBM PC ..... **£440**

**NB:** Combination prices — WS/MM  
**£390:** WS/MM/SP/SI **£399**

## DATABASE MANAGEMENT

**FORMULA II:** Unique information management system with exceptional capabilities for Application Generation. Multiple files and indexes, transaction processing, interactive, no programming language required ..... **£450**  
**dBASE II:** The most popular of data management systems, very powerful application generator ..... **£365**  
**QUICKCODE:** Add-on facility for dBASE programmers to speed development process by generating dBASE command files ..... **£200**  
**dGRAPH:** Extremely useful program for graphical representation of dBASE and user created data files ..... **£200**  
**dUTIL:** Utility to speed up dBASE execution ..... **£69**  
**CARDBOX:** Highly popular electronic card index system. Easy to use, with powerful retrieval facilities ..... **£195**  
**FRIDAY:** End user file management system from the authors of dBASE II. File definition, input and reporting under user control ..... **£195**  
**OPEN ACCESS:** Multi-function Executives Information System ..... **£450**  
**FORMULA IV MULTI-USER:** Database for PC DOS ..... **£595**  
**EVERYMAN:** Database Systems ..... **£475**

# Telesystems Ltd

The Geans, 3 Wycombe Road, Prestwood, Bucks. HP16 0ND Tel: 02406 6365

## LANGUAGES

Microsoft	CP/M	MSDOS	Digital Research	CP/M	CP/M-86	PCDOS
BASIC Interpreter	£340	£340	CBASIC Interpreter	£130	£275	
BASIC Compiler	£385	£385	CBASIC Compiler	£425	£500	£500
FORTRAN Compiler	£485	£340	PASCAL/MT +	£300	£325	£325
COBOL Compiler	£680	£680	C Compiler		£295	£295
C Compiler		£485	PERSONAL BASIC Int		£130	
PASCAL		£295	CIS COBOL	£425	£425	
BUSINESS BASIC		£450	FORMS-2	£110	£110	
Compiler	£195	£150	FILESHARE	£250	£425	
MACRO ASSEMBLER	£185	£99	FORTRAN-77		£295	£295
SUPERSOFT C Comp	£185	£185	SUPERSOFT BASIC Compiler		£200	£200
PRO FORTRAN	£220	£320	PRO PASCAL	£220	£320	£320

## UTILITIES

**ASCOM:** The most flexible asynchronous communications package available to the micro world. Interactive, batch, menu-driven. Available for CP/M, CP/M-86, MS/PCDOS ..... **£170**  
**BSTAM:** Simple communications program for exchanging files between CP/M systems ..... **£150**  
**TRANSFER:** System for exchanging files between CP/M systems. Provided with full 8080 source code ..... **£130**  
**CONVMS:** Operating system converter. Runs MSDOS programs under CP/M-86 ..... **£70**  
**CONVCP:** Operating system converter. Runs CP/M-86 programs under MSDOS ..... **£70**  
**ASSEMBLER PLUS:** Disassembler for 8080 and Z80 programs ..... **£167**  
**DISKEDIT:** Facility for editing disk held data by sector. Invaluable aid ..... **£70**  
**IBM-CP/M COMPATIBILITY:** Set of programs that enable IBM 3740 disks to be used on CP/M, permitting transfer of files to/from IBM mainframes ..... **£110**  
**SPP:** Speed Programming Package for use with Pascal/MT + ..... **£167**  
**XLT86:** Converts 8080 assembler code to 8086 ..... **£106**  
**EM80/86:** Emulator to run CP/M software under CP/M-86 and DOS ..... **£70**  
**DISPLAY MANAGER:** Screen handling productivity aid for Digital Research compilers ..... **£333**  
**ACCESS MANAGER:** File handling productivity aid for Digital Research compilers ..... **£333**

## APPLICATIONS

**MULTIPLAN:** Exceptional electronic worksheet from Microsoft ..... **£159**  
**MULTI-TOOL WORD:** Microsoft's advanced Word Processor with optional! Mouse for added flexibility ..... **£299**  
**SUPERCALC:** Fast action spreadsheet and planning aid ..... **£200**  
**ABSTAT:** Powerful statistics package ..... **£295**  
**GRAPHSTAT:** Versatile statistics and graphics package for the Epson QX10, IBM-PC and Sirius ..... **£195**  
**ALIAS ACCOUNTS:** Fully integrated accounts system with inbuilt hooks to dBASE II ..... **£1200**  
**ALIAS PAYROLL/SSP:** Standalone or integrated system with optional links to ALIAS accounts ..... each **£600**  
**RCS LEDGERS:** Sales, Purchase, Nominal ledgers in MBASIC source code ..... each **£300**  
**RCS PAYROLL:** Full function, highly used package ..... **£500**  
**STATISTICS PACK:** Over 25 easily used routines in MBASIC ..... **£120**  
**MATHS PACKAGE:** Interactive routines (40+) in MBASIC ..... **£120**

## MISCELLANEOUS

**CP/M 2.2:** Standard operating system on 8" disk ..... **£130**  
**CP/M-86:** Standard 16-bit operating system ..... **£225**  
**SUPERSORT:** Full function Sort/Merge/Selection package ..... **£145**  
**MSORT:** Standalone and COBOL hosted Sort package ..... **£149**  
**MAGSAM:** MBASIC utility to provide multi-key ISAM file facilities ..... **£150**  
**TOUCH 'N' GO:** Teach yourself keyboard skills ..... **£40**  
**MICROSOFT MOUSE:** Mouse, interface card and software ..... **£149**  
**FIXED ASSETS SYSTEMS:** ..... **£350**  
**PROSTAR TRAINING GUIDE:** Independent instruction on the use of MicroPro 'STAR' products ..... **£30**  
**EXPRESSBASE II:** Productivity aid for dBASE II ..... **£125**

PLEASE CALL FOR FULL LIST

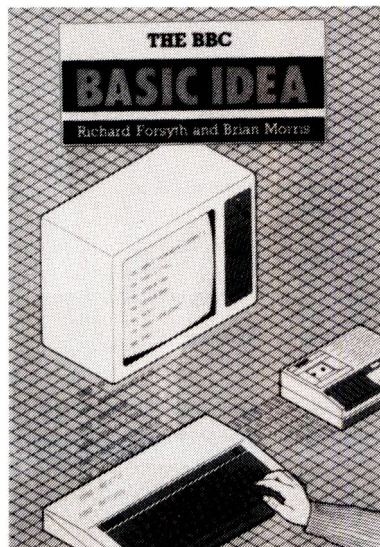
PRICES EXCLUDE VAT

DEALER ENQUIRIES INVITED



# COMPUTING TITLES FROM CHAPMAN AND HALL

## The BBC Basic Idea



RICHARD FORSYTH AND BRIAN MORRIS

This new version of one of the best ever introductory books on BASIC — *The BASIC Idea* — is aimed at BBC microcomputer users.

The aim of this book is to turn a novice computer user into a competent computer programmer by showing readers how to use modern methods of problem analysis and design. With this expertise, readers will be able to use BBC BASIC to solve realistic problems, and have fun in doing so.

June 1985 234 x 156 c.184pp  
Paperback 0 412 24900 6 c.£5.95

## Databases

### How to manage information on your micro

PETER LAURIE

Information management is one of the things computers do well. *Databases* explains clearly how information is organised in microcomputers, how the software works and how to get hold of relevant data and keep it up to date.

June 1985 176 pages  
Paperback 0 412 263807 7 £8.95

## Which Peripherals?

How to choose them,  
how to use them

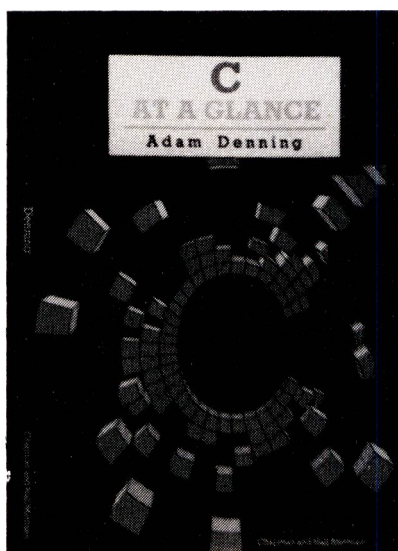
PIERS LETCHER

This book will help you to find out just what your needs are and how best to fulfil them. It will save you time and money spent in fruitless sifting through dealers lists. The book gives a comprehensive guide to what is available, which add-on works with which micro; what to look for and where to go when buying peripherals for your micro.

February 1985 180 pages  
Paperback 0 412 26510 9 £5.95

FORTHCOMING . . . .

## C At A Glance



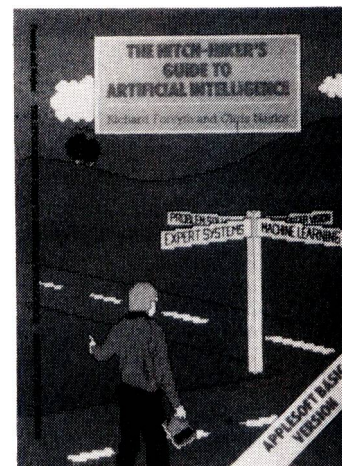
ADAM DENNING

The computer language **C** is now regarded as one of the most important systems programming languages available, as it is compact, economical and relatively easy to use.

This book aims to teach **C** to the beginner and assumes knowledge only of the host computer. The history of **C**, its basics and fundamentals and more advanced uses are all described with clarity and numerous examples are provided which demonstrate the techniques.

September 1985 234 x 156  
180 pages Illustrated  
Paperback 0 412 27140 0 £7.95

## The Hitch-Hiker's Guide to Artificial Intelligence



RICHARD FORSYTH AND CHRIS NAYLOR

This book is a practical, do-it-yourself guide for home micro users who want to delve into the exciting world of AI (Artificial Intelligence). It begins with a clear introduction to the principles of AI with an explanation of why its concepts are so important, how it can be fun to explore on micros. The book avoids the specialist AI programming languages and presents all programs in BASIC.

August 1984 234 x 156 184 pages  
BBC BASIC edition: 0 412 26970 8 £8.95  
Apple BASIC edition 0 412 27090 0 £8.95

## Everyone's Guide to Computing with the AMSTRAD CPC 464

DAVID JANDA

*Everyone's Guide to Computing with the AMSTRAD CPC 464* is more than a reliable guide to using your AMSTRAD CPC 464 colour computer; it is also a complete *introduction to computing* based on the AMSTRAD. Its aim is to let all AMSTRAD users — children and parents — understand that the micro revolution is about *computing* as well as *computer*. Learn the basics of computing and you will get the most out of your AMSTRAD quicker.

August 1985 234 x 156 c.160 pp illustrated  
Paperback 0 412 26980 5 £5.95



**Chapman and Hall**

11 New Fetter Lane, London EC4P 4EE.



# **NEW HORIZONS**

**8 ASHBURNHAM ROAD  
BEDFORD  
MK40 1DS  
TEL: 0234 53816**

**TELEX: 82392 ROBINS  
HARD DISCS PLUS CONTROLLER 10,20,40 MEGABYTE  
FOR OLIVETTI M24 PLUS IBM COMPATIBLE  
DEALER ENQUIRIES WELCOME  
EXPORT ENQUIRIES WELCOME**

## **AGENT BUYERS**

**Currently under contract to supply 3 million pounds worth of business for 1985. We like to be contact from worldwide parallel importers of personal computers. We can offer the best price from UK distributors. Assistance on hardware if required. Technical support if required. Maximum reservation to all customers.**

**IMPORT and EXPORT  
COMPUTERS**



# MoveMead Discount Software Co.

## SPECTRUM

GAME	RRP	OUR PRICE
Raid Over Moscow	7.95	6.95
Bruce Lee	7.95	6.95
Project Future	6.95	5.45
Everyones' A Wally	9.95	7.45
Buggy Blast	5.95	4.46
Daley Thompson	6.90	4.90
Beachhead	7.95	5.90
White Lightning	14.95	9.95
Sherlock Holmes	14.95	9.95
Knights Lore	9.95	7.20
Underworld	9.95	7.20
Lords of Midnight	9.95	7.95
Doomdarks Revenge	9.95	5.95
Psytron	7.95	5.90
Frank N Stein	5.95	4.45
T.L.L.	5.95	4.45
Trashman	5.95	4.45
S. Davis Snooker	7.95	5.49
Monty Mole	6.95	5.45
Full Throttle	6.95	5.45
Valhalla	14.95	3.99
Avalon	7.95	5.95
Enduro	7.95	5.95
Blockbusters	7.95	6.75
Combat Lynx	7.95	4.95
DarkStar	7.95	5.49

## SPECTRUM

GAME	RRP	OUR PRICE
Jet Set Willy	5.95	4.46
Star Strike	5.95	4.46
Travel with Trashman	5.95	4.50
Back Packers Guide to	7.50	6.10
Quasimodos Rev	6.90	5.50
Tir Na Nog	9.95	6.90
Air Wolf	6.90	5.45
Match Day	7.95	5.45
Py Jamarama	6.95	5.49
Blue Max	7.95	5.90
Machine Lightning	19.95	14.95
Monty is Innocent	6.95	4.99
Zaxxon	7.95	5.99
Great Space Race	14.95	3.99
Potty Pigeon	6.95	5.49
Pitfall II	7.95	6.95
Ram Turbo Interface	22.95	19.99
Match Point	7.95	4.99
Gift of the Gods	9.95	7.95
Tripods	11.50	6.99
Boulder Dash	7.95	4.99
Alien 8	9.95	7.95
Ghostbusters	9.95	7.45
Software Star	6.95	5.95
Technician Ted	5.95	4.75
Heroes of Khan	5.50	4.50

## COMMODORE 64

GAME	RRP	OUR PRICE
Sentinal	9.95	7.95
Ghostbusters	10.95	8.30
Suicide Express	7.95	5.99
Other Activision	9.95	7.95
Zim Sala Birn	9.95	7.95
Strip Poker	9.95	7.95
Psytron 64	7.95	5.95
Tales of Arabian Nights	7.00	5.00
Beachhead	9.95	7.95
Solo Flight	14.95	12.45
Death Star Interceptor	9.95	6.99
Bruce Lee	9.95	8.45
Nato Commander	9.95	7.95
Spitfire Ace	9.95	7.95
My Chess II	11.95	8.46
Battle for Midway	8.95	4.99
Quasimodos Revenge	7.90	5.90
Zaxxon	9.95	7.95
Summer Games	14.95	10.30
Sherlock	14.95	12.45
PSI Warrior	9.95	7.95
Raid over Moscow	9.95	7.95
Staff of Karnath	9.95	6.99
Blue Max	9.95	6.95
Tappper	9.95	7.50
Bristles	9.95	3.99

## COMMODORE 64

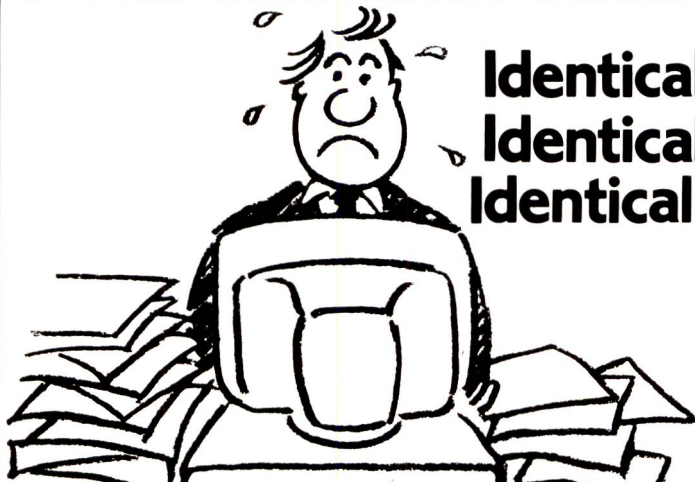
GAME	RRP	OUR PRICE
Spy vs Spy	9.95	7.95
Boulder Dash	8.95	6.45
Hobbit	14.95	7.99
Daley Thompsons Decath.	7.90	5.25
Kong's Revenge	7.90	6.50
Fighter Pilot	9.95	7.50
Breakfever	7.00	5.49
Combat Lynx	8.95	5.95
White Lightning	19.95	14.95
Spiderman	9.95	7.95
Cad Cam Warrior	9.95	7.50
F15 Strike Eagle	14.95	12.45
Flip & Flop	9.95	3.99
Suicide Strike	8.95	6.95
Spy Hunter	9.95	7.50
Impossible Mission	8.95	7.45
Castle of Terror	9.95	7.50
Astro Chase	9.95	3.99
Shoot the Rapids	7.95	6.50
Lords of Midnight	9.95	7.30
Congo—Bongo	9.95	7.95
Battle for Normandy	14.95	12.45
Combat Leader	14.95	12.45
Cassette 50	9.95	5.95
Kong Strikes Back	7.90	5.45
Up and Down	9.95	7.95

All prices include VAT. Postage and packing is **FREE** on orders in excess of £15.00. All orders of less than this amount are charged 0.75p towards the cost. 1,000's of more titles available for all machines. Send a S.A.E. for full list. Send your cheque/P.O. for the full amount (plus postage, if required), to:—


**MOVEMEAD (MARKETING) LIMITED, 55 ALESBUSY STREET  
BLETCHLEY, BUCKS., MK2 2BH Telephone: (0908) 79232/3**



Order despatched within 3 days of receipt of your order and cheque/P.O. All tapes are offered subject to availability. E&OE.



## Identical twins Identical tasks Identical micros



## What's the twin on the right got the other hasn't?

In short, the **Recall** full text retrieval system. It's a revolutionary new software package for micros.

It means the twin on the right has instant access to information regardless of its size, shape or content.

While the one on the left has to scroll through endless text files and hunt through endless piles of paper for the same information. He could be there until Christmas.

At which time his twin should display some goodwill and tell him about **Recall**.

Up to 1,000 individual documents (contracts, press releases, reports, letters etc) can be stored any way you like and minutely examined for the information you want. Just describe it in plain English and hey presto the information is there.

You can then display it, print it, or write it to disk, in whole or in part. Within seconds you can complete a task that could take you until Christmas.

What's more the price makes **Recall** a real gift. Just £195 + VAT. Uptil now you had to pay a fortune (up to £25,000) and have a mainframe to boot to enjoy the advantages of text retrieval.

**Recall** is compatible with the IBM PC/xT, DEC Rainbow and ACT Apricot.

# Recall

## Full text retrieval system

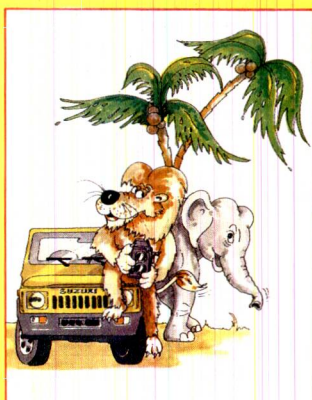
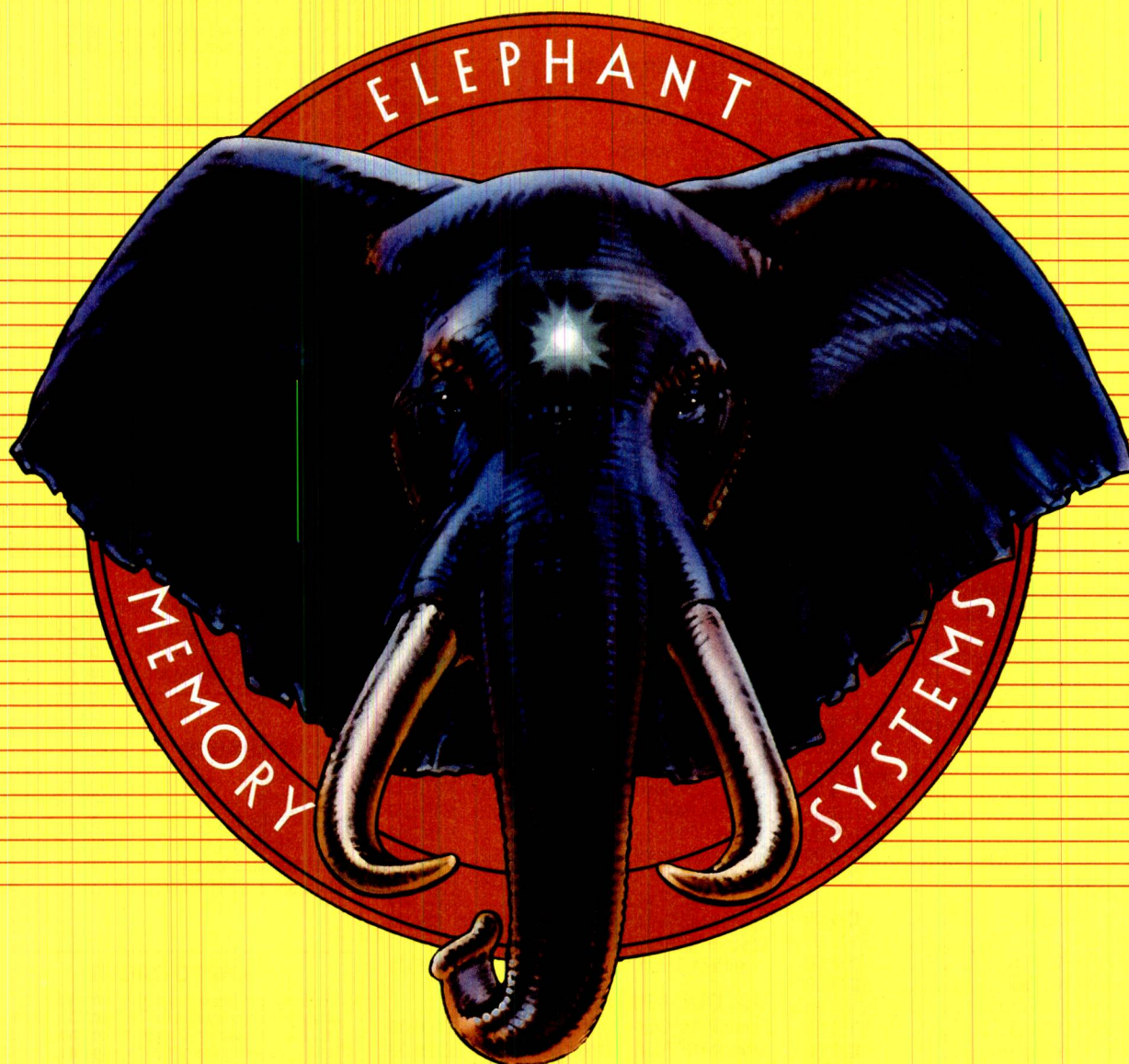
If it all sounds too good to be true contact Steve Robinson on Bristol 28893/4/5/6 for the full Recall story.

**IN SOFT** Ltd.

35 King Street, Bristol BS1 4DZ.  
Tel (0272) 28893/4/5/6.



# WIN A SAFARI TO KENYA



An opportunity to win a super ELEPHANT Safari for two persons – luxury accommodation, travel and all expenses paid – with every purchase of a 10-disk ELEPHANT pack made between 1st April and 30th June 1985! Look for your participating ELEPHANT Dealer's special Competition Display and pick up a simple puzzle card with your purchase. Send it to us with an ELEPHANT 10-pack top to receive, completely free, an ELEPHANT 'T' shirt and an opportunity in this exciting competition. Each subsequent 10-pack purchase and completed puzzle card gives you another opportunity – there's no limit!

Should you have difficulty in obtaining ELEPHANT products, phone or write for details of your nearest Dealer.

**Dennison**

## ELEPHANT NEVER FORGETS

**Dennison Manufacturing Co. Ltd.**

Colonial Way, Watford, Herts WD2 4JY, Tel: Watford (0923) 41244, Telex: 923321

**France:** Soroclass, 45, rue de l'Est - 92100, Boulogne.

Tel. Réseau de Distribution: 606.98.99. Administration des Ventes: 606.70.78, Telex: EMS 206 436 E

**Germany:** Marcom Computerzubehör GmbH, Podbielskistr. 321, 3000 Hannover 51, Tel: (0511) 647420, Telex: 923818

**Other Countries:** Dennison International Company, 4006 Erkrath 1, Matthias-Claudius-Strasse 9, Telex: 858 6600



# MM

# PC PRICE BONANZA

## PROFESSIONAL SERVICE

## EXPERT ADVICE

## PROMPT DELIVERY

### PC's & COMPATIBLES

EX VAT

APRICOT PORTABLE 256K 1 x 720K Drive	£1295
APRICOT 256K 2 x 315K Drives & Monitor	£1295
APRICOT 256K 2 x 720K Drives & Monitor	£1545
APRICOT Xi 256K 10MB & Monitor	£2195
APRICOT Xi 512K 10MB & Monitor	£2595
APRICOT Xi 512K 20MB & Monitor	£2995
COMPAQ 2 2 x 360K drives	£1795
COMPAQ PLUS 10MB	£3195
ERICSSON 256K 2 x 360K Drives	£1645
ERICSSON 256K 10MB	£2695
MACINTOSH	£1495
OLIVETTI M24 256KB 2 x 360KB Drives	£1690
OLIVETTI M24 256KB 10MB	£2810
OLIVETTI M21 256KB 2 x 360KB Drives	£1590
OLIVETTI M21 256KB 2 x 720KB Drives	£1810

### EXTERNAL STORAGE DEVICES

PLUS 5 20MB + 5MB CARTRIDGE	£2325
PLUS 5 30MB + 5MB CARTRIDGE	£2845
PLUS 5 40MB + 5MB CARTRIDGE	£3059
CIPHER CARTRIDGE TAPE STREAMER	£795
SIMONS 20MB TAPE STREAMER	£895

### MEMORY BOARDS

128K MEMORY EXPANSION	£149
256K MEMORY EXPANSION	£219
512K MEMORY EXPANSION	£549
PC NET STARTER KIT	£795

### PC SOFTWARE

EX VAT

CAXTON CARDBOX	£165
DBASE II	£265
DBASE III	£325
DMS DELTA 4	£375
DMS +	£155
DR FORTAN 77	£199
DR PASCAL	£250
DR ASSEMBLER Plus Tools	£125
FRAMEWORK	£325
FRIDAY	£135
KNOWLEDGEMAN	£380
LOTUS 1 2 3	£345
MICROSOFT WORD	£240
MULTIMATE	£295
MULTIPLAN	£125
MULTIUSER ACCOUNTS per Module	£295
OPEN ACCESS	£325
PEACHPAK	£150
PEGASUS LEDGER MODULE	£200
R. BASE 4000	£295
SAGE ACCOUNTS	£250
SAPPHIRE DATAMASTER	£395
SMART SOFTWARE SYSTEM	£495
SYMPHONY	£425
TK SOLVER	£245
VOLKSWRITER DELUXE	£235
WORDSTAR	£195
WORDSTAR PROFESSIONAL	£260
WORDSTAR 2000	£295

### PC PRINTERS

EX VAT

ANADIX DP-6500 500cps	£2295
DRE 8850 300lpm	£2065
EPSON LQ 1500 200cps (NLQ)	£895
HEWLETT PACKARD LASER PRINTER	£2895
JUKI 6300 40cps	£749
MANNESMANN MT180 160cps (NLQ)	£549
MANNESMANN MT400 400cps (NLQ)	£1595
NEC 2050 20cps	£625
NEC 3550 35cps	£955
NEC PINWRITER P2(P) 180cps	£535
NEC PINWRITER P3(P) 180cps	£595
OKI 84A 200cps	£645
OLI 2350 (P)	£1435
OLIVETTI DY450 45cps (P)	£765
PANASONIC KX-P1091 120 cps + NLQ	£269
QUIME 11/55 RO IBM 55cps	£1745
RICOH FLOWRITER 1600 46k	£1349
TOSHIBA TH2100H 192cps (P)	£1350
TREND 930 200cps NLQ 80cps	£1350

## MAYFAIR MICROS

BLENNHEIM HOUSE, PODMORE ROAD,  
LONDON SW18 1AJ

TEL: 01-871 2555 / 870 3255

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

NEXT DAY INSURED COURIER DELIVERY AVAILABLE

### MONITORS

Microvitec 1431 Standard Res.	£189.00
Microvitec 1451 Medium Res.	£289.00
Microvitec 1441 High Res.	£399.00
Microvitec 2031 20" Standard Res.	£315.00
Microvitec Sinclair QL	£270.00
Philips BM7502 V.H. Res (Green)	£85.00
Normende TV/Monitor + Remote control	£249.00
Ferguson CTV + RGB	£240.00
Philips CTV + RGB	£229.00
Kaga RGB Vision III 12"	£369.00
Kaga 12" H.R. Green	£118
Sanyo SCM 14" VHR	£425.00
Novex 1414 colour Monitor	£215.00

### DISC DRIVES

BBC Single 100K Drive	£99.00
BBC Dual 200K	£189.00
BBC Dual 200K 40 Track	£159.00
BBC Dual 400K 40 Track	£299.00
BBC Single 400K 80 Track	£159.00
BBC Dual 800K 80 Track	£318.00
BBC Single Power Supply	£20.00
BBC Dual Power Supply	£29.00

### DAISYWHEEL PRINTERS

Brother HR15	£378.00
Brother HR15 Keyboard	£155.00
Brother HR15 Sheet Feeder	£212.00
Brother HR15 Tractor Feed	£71.00
Quen Data 20 CPS	£249.00
Juki 6100 18 CPS	£340.00
Juki Single Sheet Feeder	£230.00
Juki Tractor Unit	£115.00
Juki RS232 Interface	£74.00
Juki Spare Daisywheel	£16.00

### PRINTERS

Brother EP44	£228.00
Brother HR5	£148.00
Canon PW1080A 160 CPS (NLQ)	£289.00
Canon PW1156A 160 CPS (NLQ)	£399.00

Kaga KP810 (NLQ)	£285.00
Kaga KP910 (NLQ)	£399.00
Kaga RS232 + 2K Buffer	£95.00
Ensign 1650 165 CPS	£305.00
Epson RX80T 100 CPS	£212.00
Epson RX80F/T 100 CPS	£240.00
MP-165 (NLQ)	£316.00
Panasonic KP1091	£325.00
Seikosha GP100A	£189.00
Epson RX100F/T 100 CPS	£396.00
Epson FX80 160 CPS	£370.00
Epson FX100F/T 160 CPS	£494.00
Shinwa CP80	£199.00
Riteman Compact 120 CPS	£199.00
Star Gemini 10X 120 CPS	£230.00
Star Gemini 15X 120 CPS	£339.00
Epson 814RS232 Interface for FX and RX	£34.00
Epson 814RS232 Interface with 2K Buffer X On/Off	£65.00

### COLOUR PRINTERS

Canon PJ1080A 7 Colour 40 CPS Ink Jet	£440.00
Seikosha GP700A 7 Colour 50 CPS	£399.00

COMPUTERS, SOFTWARE,  
ACCESSORIES, UTILITIES  
and lots, lots more!!

### DISKS

Very high quality Fuji  
Diskettes, guaranteed for life  
at only £20.00 per box  
(Double-sided 80 track)

### BBC UPGRADES

A-B Upgrade	£110.00
DFS Interface	£120.00
Econet Interface	£69.00
Speech Interface	£54.00
RS232 Interface for any Centronics-type Printer	£34.00

### HOW TO ORDER

You may purchase any of the items listed by cheque made payable to: Twillstar Computers Ltd. Barclaycard or Access. All you have to do is fill in your requirements on a separate sheet of paper, post to us and we will despatch within 24 hours, subject to availability. All prices inclusive of 15% VAT. ADD £2.50 P&P for orders below £150. Over add £8 P&P. Credit card holders may order by telephone. Give card number, name, address and items required. Please note VAT is not charged on export orders. Export customers please ring for details of P&P.

# TCL



TELEPHONE ORDERS  
(01)574 5271

Open  
6 days a week  
9am to 7pm  
Monday to Saturday



# Twillstar Computers Limited

17 Regina Road, Southall, MIDDLESEX UB2 5PL. TEL: (01)574 5271



# If you thought great achievements had stopped, take a look at the Fujitsu Micro 16s.

In 1969, Neil Armstrong was the first man on the moon. A great achievement for mankind.

Yet great achievements didn't stop 16 years ago. Fujitsu's achievements in mainframes, telecoms, chips and micros have made us Japan's number one computer company.

Now we announce another great achievement - the Fujitsu Micro 16s that gives you computer performance that is out of this world. The FM16s is capable of expanding to a five terminal multi-tasking, multi-user configuration with total flexibility and the minimum of hardware redundancy. It runs under our latest Concurrent CP/M, CP/M 86, MS-DOS and P-System operating systems.

The entry level business system comes complete with WordStar, SuperCalc 2, Personal Basic and GSX - and all at under £1950\*.

The FM16s - one of the great achievements from Fujitsu.

\* Price as at April 1985.

## Fujitsu Micro 16s

Both 16 bit and 8 bit processors for 16 and 8 bit software programs.

Multi-user (up to 6 stations total).

128K Byte RAM expandable to 1MByte.

Two 5¼" Floppy Disk drives, IBM format.

Graphics capability.

Several operating systems and free bundled software.

Note: The following trademarks are registered:  
WordStar - Micropro International  
SuperCalc 2 - Sorcim/IUS Micro Software  
CPM, Personal Basic, GSX - Digital Research Inc.  
MS-DOS - Microsoft Inc.  
P-System - Softech/UCSD

## FUJITSU Mikroelektronik MICRO COMPUTER SYSTEMS

Hargrave House Belmont Road  
Maidenhead Berks SL6 6NE  
Tel: 0628 76100 Telex: 848955



Send today for your information pack.

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Tel. No. \_\_\_\_\_

PCW 6 \_\_\_\_\_

Tick ☐ Dealer ☐ End-user

**FUJITSU**

FUJITSU MICRO COMPUTER SYSTEMS  
Hargrave House Belmont Road  
Maidenhead Berks SL6 6NE



# Britain microcomp



Britain's no. 1 microcomputing show is back at Olympia in September. More than 45,000 people visited the Personal Computer World Show in 1984 and this year's event will be even bigger.

For the first time, alongside all the household names you expect at the PCW Show, there's a separate hall for business computer buyers only.

That's where you can be sure to find help in solving your business problems. A wide selection of hardware, software and peripherals — from industry majors as well as smaller specialist suppliers — in every price bracket. Plus special features such as these:

- The advice centre and workshop sessions organised by the National Computing Centre.

- Our new applications software advisory service where you can find out exactly which software meets your specific business needs.
- The consultancy area with experts offering advice both on system selection and operational problems.
- And of course the PCW Show product locator service to help you find specific products at the show.

So whether you're a retailer or a builder, an accountant or a doctor — in fact, whatever your business or profession — you can be sure to profit from the Personal Computer World Show. Start planning your visit now. Put the dates 4-8 September in your diary.

Tickets and further details from:  
PCW Show 85, 11 Manchester Square,  
London W1M 5AB or phone 01-486 1951.



# 's no.1 uting show



The 8th  
**Personal  
Computer**  
World  
Show

**4-8 SEPTEMBER 1985  
OLYMPIA, LONDON**

Sponsored by Personal Computer World

**Put it in your  
diary now!**



# The Great British Laboratory Micro System!



The CED 1401, real time heart of professional laboratory systems

High performance hardware  
and

Full laboratory software – including FFTs – is standard

Demonstration programs include Spectrum Analyser, Signal Averager

The 1401 is made in Cambridge, England—and runs just as fast with Apples and IBMs too!

# CED

## Real-time Computers

Tel: Cambridge (0223) 316186

Science Park,  
Milton Road,  
Cambridge,  
CB4 4BH



# Instant Financial Picture With Your Analyst!

**CPA version now available!**



Specifically, a financial analyst.

Like the BottomlineV™ software package. Because unless you've got hundreds of hours for programming, you'll go nuts doing financial planning, analysis, modeling or five-year forecasting with spreadsheet software alone.

## **Your personal financial advisor.**

BottomlineV takes the mystery out of financial analysis and planning. Working with your spreadsheet software, it gives you instant access to the same profitability measures and financial ratios that bankers use to test investment soundness.

You'll know in seconds important long-range information—the kind of facts and figures that give you credibility when you establish lines of credit, raise venture capital or obtain a loan.

## **No programming required.**

BottomlineV makes forecasting and modeling easy because it does hundreds of complicated calculations for you. That's right, it does hundreds of calculations. If you make a change to any part of your model, it will ripple through the entire model. Automatically updating it.



BottomlineV instantly produces the reports you need to see your complete financial picture.

For example, suppose you want to know how an increase in sales will affect your profit picture.

BottomlineV will tell you.

First, it will revise your income statement (P&L).

Then it will update your balance sheet and cash flow to see if your goal is achievable.

It will even give you 24 different ratio analyses that will help you better plan and run your business.

With BottomlineV, you don't have to know computer programming. You don't have to be an accountant. You hardly even have to know how to

operate your spreadsheet software. Yet you will be able to see your complete financial picture. Instantly.

BottomlineV works with IBM®, Apple®, Kaypro®, DEC® and most other MS-DOS and CP/M systems.

It sells for only £295.00. For that kind of money, no other financial analyst can give you so much good advice.

Go to your nearest dealer and ask for a BottomlineV demo. (Also ask about our other new packages:

BottomlineTAX™  
BottomlineGRAF™  
and d-Bottomline™)

## **Bottomline V**

**We take over where spreadsheets leave off.**  
**(80% of our customers are Lotus 1-2-3 or Symphony users)**

**Erma (UK) Limited, Unit 3, Heliport Trading Estate, Lombard Road, London SW11 3RE. Tel: 01-228 1551**

VisiCalc, Lotus 1-2-3, MultiPlan, SuperCalc, Perfect Calc, IBM, Apple, Kaypro and DEC are registered trademarks of, respectively, VisiCorp, Lotus Development Corp., Microsoft Corp., Sorcim Corp., Perfect Software Inc., International Business Machines Corp., Apple Computer, Inc., Kaypro Corp. and Digital Equipment Corp.



# NEW AND DEMO STOCK AT MORGAN

(All plus VAT)

## APPLE — software

Apple Writer .....	£45
Apple Quickfile .....	£35
Multiplan .....	£43
Visicalc .....	£43
80 Col Card for 11e .....	£35
Parallel Card .....	£30
Serial Card .....	£45
UHF Modulator .....	£15
Visiterm/Visished .....	£35
Visiplot .....	£35
Extended 80 col(11e)+64k .....	£75
Business Graphics .....	£45
Systematics 11e .....	£xx
Purchase Ledger .....	£65
Sales Ledger .....	£65
General Ledger .....	£65
Stock .....	£65
Invoicing .....	£65
Disk Controller .....	£45
INTEGER Card .....	£50
Apple Pascal II & III .....	£45
CCA Database .....	£35
DBASE 11 .....	£150

## HARDWARE

Apple Disk Drive .....	£135
Apple Monitor .....	£75
Apple 111 .....	£750
Apple EUROPLUS .....	£225
Apple 11c Drive .....	£200
Centronics Card .....	£30
Serial Card .....	£45
I-EEE Card .....	£85
Silentype Printer .....	£45
Joystick .....	£15
Grappler Card .....	£70
Mackintosh .....	£1200
Apple 111 disc drives .....	£95

## IBM

IBM PC Complete .....	£1200
IBM Graphics Printer .....	£295
AST Megaplug Cards .....	£250
Tallgrass Hard Disk .....	£600
Dbase 11 IBM .....	£150
IBM Colour Mon .....	£350
F.T. Moneywise .....	£200
Framework .....	£295
Symphony .....	£350
SDLC .....	£90
AT Serial Cable .....	£45
AT Parr/Ser Cable .....	£80
IBM Portable .....	£1400
IBM Expansion Unit .....	£1000
Displaywriter 11 .....	£195
Lotus 123 .....	£225
HMS PC,AT,XT,PORT .....	£50
PFS series each .....	£50

## ACT

Apricot Twin Drive	
256k inc Monitor .....	£1100
ACT printer 15 .....	£225
Apricot Portable .....	£1250
DBASE 11 .....	£150
Wordstar .....	£150
Most Pulsar Grey .....	£65
Citoh Plotter .....	£400
Spare Monitors .....	£100

## EPSON

HX 20 .....	£295
QX 10 .....	£800
CX21 .....	£125
Sheet feeder LQ1500 .....	£250
Keyboard DX 100 .....	£100
Many Cable RIBBONS ECT	

## DEC

DEC LA50 .....	£300
DEC LQP02 .....	£750
DEC 350 Mini .....	£1750
CPM Card .....	£150
64K Upgrade .....	£125

## OLIVETTI

M10 Modem .....	£70
Olivetti Jet Printer .....	£125
Colour Mon. M24 .....	£300
MIO Portable .....	£250

## MISC

HR 25 .....	£450
PR1 Acou Coup .....	£90
Atari 600xl .....	£50
Microvitec Mon .....	£150
HP 86 cpu .....	£495
Honeywell L32 .....	£295
NEC spinwriter .....	£700
Rioch 1600 'S' .....	£550
Seikosha GP 50 .....	£50
Seikosha GP 100 .....	£90
VTX modem .....	£50
Taxan Col mon .....	£150
Dragon 32 .....	£45
Kaga mon from .....	£50
Juki 6100 .....	£300
Microwriter .....	£195
HP 7470A .....	£600
HP 7475 .....	£995
Buzz Box Modem .....	£75
Oric Atmos .....	£45
Oric 4pen Plot .....	£60
Compaq Port .....	£1300
Tandy Model 4 .....	£650

## SANYO MBC 2000

12" GREEN SCREEN twin	
320k drives cpm .....	£395

# MORGAN CAMERA COMPANY

179 TOTTENHAM COURT ROAD, LONDON W1

Tel: 01-636 1138



# MEGA-BOARD™-XT

**#1 CHOICE OF MAJOR OEM MANUFACTURERS, UNIVERSITIES, RESEARCH LABS ETC.** A THOROUGHLY FIELD PROVEN DESIGN. HIGH VOLUME PRODUCTION ENGINEERED.

- **FULL IBM PC-XT\* COMPATIBILITY!**
- **FULL MEGA-BYTE RAM CAPACITY ON MOTHERBOARD!**

**THOUSANDS SOLD WORLD WIDE!**

**DEALERS AND OEM MANUFACTURERS QUANTITY DISCOUNTS AVAILABLE**

**Eight Compatible I/O Interface Connectors**

(Full PC compatible)  
(compatible with all IBM-PC\* plug-in cards)

**Special J1 Interface**

(Allows horizontal mounting of compatible expansion cards for easy bus expansion and custom configuring) (Board has 62 pin gold plated compatible connector)

**Extended ROM Capability**

(Runs all compatible PC ROMS) (Jumper programmable to accommodate all popular 8K, 16K, 32K and 64K ROM chips and NEW EE ROMS! VPP power pin available for EP ROM burning!) (External VPP voltage required)

**Full Mega-Byte Ram Capacity! On board!**

- 256K Bytes using 64K chips
- 1 Mega Bytes using 256K chips

**Standard Key-board Interface**  
(Full PC compatible)

**Hardware Reset**  
(Overcomes reset flaw in PC)

**Power Connector**  
(Full IBM\* pinout compatible)

**8088 Processor**  
(Same as PC)

**8087 Numeric Processor**  
(Same as PC)

**Peripheral Support Circuits**  
(Same as PC)

**Configuration Switches**  
(Same as PC)

**Speaker/Audio Port**  
(Same as PC)

**Wire Wrap Area**  
To facilitate special custom applications!

**ONLY!**  
**\$9995**  
**Evaluation Board Kit**

**Mega-Board™ Evaluation Board Kit!**  
(Blank board with full assembly instructions and parts list.)

Includes highest quality PC board with gold plating, silk screen, solder mask

**Board Size** 10.5 inch X 13.5 inch

- MEGA-BOARD™ — XT
  - BARE BOARD KIT ..... £ 79.00
  - ASSEMBLED AND TESTED SOCKET KIT (LESS IC'S) (FULLY SOCKETED) ..... £158.00
  - ASSEMBLED AND TESTED — COMPLETE (INCLUDES USERS MANUAL AND MEGA-BIOS ROM) ..... £412.00
- USERS MANUAL WITH THEORY OF OPERATION, SCHEMATICS, BLOCK DIAGRAM, APPLICATION NOTES ..... CALL
- MEGA-BIOS™ ROM (2764) FULLY XT COMPATIBLE, MS-DOS, PC DOS ..... CALL
- HARD TO GET PARTS ..... CALL

**FREE OFFER**

**FREE! Displaytel™ Exclusive.**  
Our Commitment to Microcomputer Education!

**FREE Intel 8088 Data Book** with each Mega-Board™ Order!

**ORDER NOW!!!** Fast, friendly service

**CALL 214-991-1644**



**Immediate shipment!**  
Most instock items shipped same or next day!

10 Day money back guarantee if not completely satisfied!

**DTCTM** DISPLAY TELECOMMUNICATIONS CORPORATION

4100 SPRING VALLEY ROAD  
SUITE 400  
DALLAS, TX 75234  
(214) 991-1644

**TERMS:** We accept cash, checks, money orders, and purchase orders from qualified firms and institutions. Prices and availability subject to change without notice. Shipping and handling charges via UPS ground add \$3.00/box. Minimum charge \$3.00.



## THE FIRST SECURE COMPUTER WORKSTATION

The Compukart holds your P.C. Monitor, Keyboard, Disk Drives, Expansion Chassis, Software and Manuals. You lock them away with your own personal key.



Its adjustable design accepts most floor space, and rolls easily wherever needed.

**COMPUKART LTD.**  
5 ARDEN GROVE, HARPENDEN, HERTS.

PLEASE SEND ME FURTHER DETAILS OF COMPUKART

NAME ..... POSITION .....

COMPANY .....

TEL. NO. ....

## THE INSTITUTION OF ANALYSTS & PROGRAMMERS



An association which is widely recognised and respected, endorses the status of its members, protects and promotes their interests, assists their careers and encourages their ethical standards is the foundation of every profession.

The Institution of Analysts & Programmers is the leading association for those who use, develop and organise systems analysis and computer programming for Commerce, Industry or Public Service as a principal or supplementary part of their professional life. Awareness of the Institution and the high regard accorded to its members has brought inquiries and applications from over forty independent countries and states.

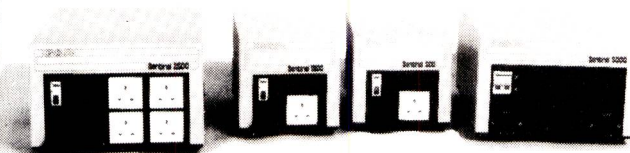
The essential qualification for election is practical experience but grading allowances are made for degrees, diplomas and course certificates of recognised universities and training organisations and for memberships of other professional associations and learned bodies. A guide to membership requirements and gradings may be requested by telephone or letter addressed to the Applications Department.

01-898 2385

**The Institution Of Analysts & Programmers**  
GIBSON HOUSE, FOURTH CROSS ROAD, TWICKENHAM  
MIDDLESEX, TW2 5EL, ENGLAND

## Data Corruption?

Voltage surges, sags, spikes, glitches, R.F. and other mains interference can corrupt vital data, a nightmare for many people reading this ad. Banish the nightmares with a Sentinel Line Conditioner.



- ★ Inexpensive to run, being 97% efficient.
- ★ Wide input voltage capability + 20% to -28%.
- ★ Up to 5KVA loading.
- ★ 115V, 220V, 240V options.
- ★ European or U.K. standard socket options.
- ★ 50 or 60Hz option.
- ★ R.F./Noise isolation:- >100db @ <100KHz  
> 60db @ >100KHz

## The Solution

Two decades of design and manufacture enable us to offer:-

- ★ Office UPS systems from 250VA to 20KVA.
- ★ Industrial UPS systems 500VA to 400KVA.
- ★ Microprocessor controlled line conditioners 500VA to 5KVA.
- ★ Ferroresonant line conditioners 5KVA to 135KVA.
- ★ Mains filters/Spike catchers up to 750VA.
- ★ Frequency changers up to 135KVA.
- ★ Inverters up to 135KVA.
- ★ Customised and Military Spec., (05-21) specials.

**G&R**  
ELECTRONICS LTD

**THE WORLD OF POWER**



## ADVANCED INPUT DEVICES (UK) LTD BUSINESS SERVICES DIVISION SAVE ON PRINTERS!

Quen-Date Daisy Wheel & Dot Matrix Printers (Epson compatible)  
"New" Dot Matrix Printer - IBM PC compatible  
Send for Price List & Literature. (Dealer enquiries invited)

## SAVE ON SOFTWARE!

Save up to 40% on most popular business packages  
PC DOS, MS DOS, CPM/86, CPM/80. Most formats available.  
Special offers on: Easy Junior Integrated Accounts, UIS "RAP" Communications Software and Telecom Gold Mailbox  
Send for details and Price List.

## SAVE ON POWER PRODUCTS!

Solve all your mains power supply problems - Uninterruptable Power Supply (UPS) Units, Constant Voltage Line Conditioners (CVT), Surge and Spike protectors for individual and multiple equipment situations.  
All UK manufactured by Rayman Electronics. Send for details.

## ELECTRONIC SHOP! SHOP BY MODEM!

Use your computer to shop from the comfort of your home - our Data Base will shortly be available on-line for instant shopping. Browse through our extensive range of products including business software, games, printers, listing paper, accessories, sundries, etc.

No modem yet? No problem - direct connect low cost modems through to full auto-answer/dial versions available. Send for application form to join the Discount Shopping Club and Access details for Electronic Shopping.  
(Starts early May 1985 and includes Electronic Mail facilities for Members)

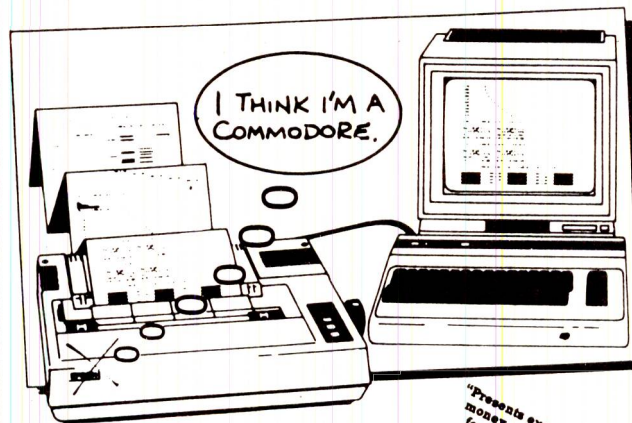
Write for details to:

**ADVANCED INPUT DEVICES (UK) LTD**  
Freepost, Pinner, Middx. HA5 2BR  
(no stamp required)

or phone our 24 hour answerphone service  
**01-429 2675**



## An Epson in Commodore clothing



How many Commodore home computer owners, when faced with buying a printer, have longed to own an Epson but been put off by the problems involved? Firstly, it's not easy to connect the two together. Secondly, even when connected, it may be necessary to load driver software or the cartridge slot may be unusable. Finally Commodore-specific characteristics such as graphics and formatting commands will not be available.

Now Micro Control Systems have the solution. Just plug the Comprint circuit board inside the Epson, connect the cable supplied to the Serial I/O port on the Commodore computer and Hey Presto! The Comprint looks the Commodore into thinking it is working with a Commodore printer. All the features are there - total emulation. And it even provides a 2K buffer as well.

What's more all the additional features that have made Epson so successful, such as condensed print and other type styles, are accessible directly by the Commodore computer. For the business user the ability to use 18 inch paper (in the MX/22/7X-100 range) and print a sign (or other Epson special characters) will prove invaluable.

So go on - spoil yourself. If you are the owner of a Commodore personal computer treat yourself to an Epson - and a Comprint of course!

"Presents excellent value for money... a worthy purchase for any Commodore 64 or VIC 20" - PCW, January 12th, 1985

"This is one of the most versatile printer interfaces I have used... a combination that will do almost anything you ask of it" - Commodore User, January 1985

"Undeniably an interface to look at" - Commodore Computing Int., May 1985



Available from:-

**Price £61.99 inc VAT** Please add £1 P&P



**CHROMASONIC**  
48 JUNCTION ROAD  
ARCHWAY  
LONDON N18 5RD  
TEL 01-263 9483

**OR A-LINE COMPUTER SYSTEMS**  
1 CHURCH FARM LANE,  
WILLOUGHBY, WATERLEYS  
LEICESTER LE8 3UD  
TEL (053756) 486

**DISTRIBUTOR**  
ENQUIRIES TO:-  
**MICRO CONTROL**  
SYSTEMS LTD  
TEL (0773) 769011

**NOW AVAILABLE**

**A LOW COST DISC BASED**

## PROFESSIONAL ACCOUNTING PROGRAM

For The BBC Computer

### "Micro-Trader"

#### INTEGRATED SALES PURCHASE AND NOMINAL LEDGERS

Designed for business use by a business man. "Micro-Trader" is a fully integrated program in which all Sales and Purchase Ledger Transactions are automatically updated to the Nominal Ledger.

"Micro-Trader" offers full Sales and Purchase Ledger facilities including SALES INVOICE and STATEMENT PRINTING with a capacity of 450 accounts and 3000 transactions per month in each Ledger.

Normal Income, Expenditure, Assets, Liabilities & Journal Posting in the Nominal Ledger with full Reporting for individual accounts, Audit Trail, Trial Balance, Profit & Loss and Balance Sheet.

"Micro-Trader" is certified by Customs and Excise for V.A.T. extraction.  
A V.A.T. Return produced in 2 minutes!!!!

STOCK CONTROL and MAILMERGE programs can be added



PHONE TODAY FOR A FREE FACT SHEET

**MEADOW COMPUTERS**

HEBREWS MEADOW, LOWER EVINGAR ROAD, WHITCHURCH, HANTS.

Telephone: Whitchurch (025682) 2008



## DEALERS AND CONSULTANTS in

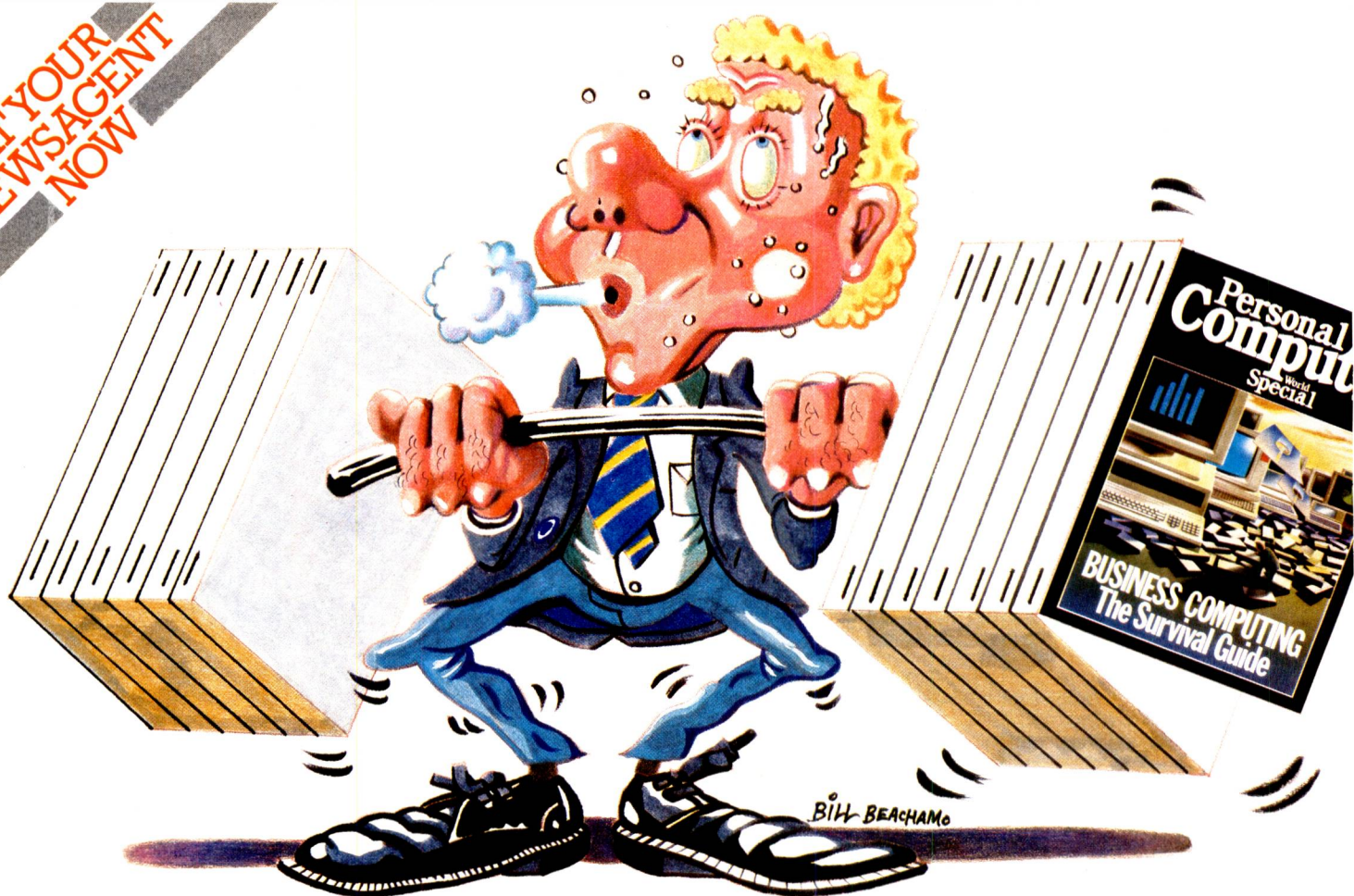
small business systems and personal computers for electronic mail, telex, public and private viewdata, accessing UK and Overseas on-line databases, single and multi-user business software.

**Microcomputer Systems and Services**  
Imperial House, Lower Teddington Road  
Kingston upon Thames Surrey KT1 4EP

Tel: 01-943 4366 Telex: 928017 Scott G  
TG Mailbox: MMU429 Prestel Mailbox: 019434366



AT YOUR  
NEWSAGENT  
NOW



# SURVIVAL OF THE FITTEST...

# PCW **Workout**

Personal Computer World announces a special Business Computing Survival Guide – a guide that explains, entertains and educates everyone who has bought – or is about to buy – micro computer hardware, software and peripherals, to further their professional needs.

Read it and discover how to prepare a shortlist. Find out what software can really help – or even hinder – your efficiency. Understand the implications of communications. Learn how to get the best deals – and the best service – from dealers.

Written by a team of impartial experts, carefully selected by PCW, the Business Computing Survival Guide costs an incredibly low £2.95. Order your copy now – you may not survive without it.

## PRIORITY ORDER FORM

Yes, I want the real facts about business computing today. Send me immediately the PCW Survival Guide for only £2.95 plus 55p postage and packing, total £3.50.

☐ I enclose a cheque payable to Personal Computer World for £ \_\_\_\_\_  
☐ Please charge my ☐ Visa ☐ Access ☐ AmEx ☐ Card No: \_\_\_\_\_

Expiry Date: \_\_\_\_\_ Signed \_\_\_\_\_

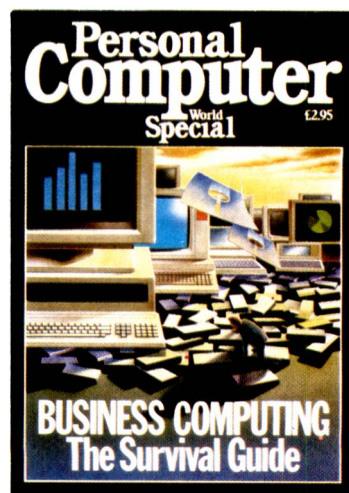
Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Please send this order form with your remittance to Personal Computer World, Subscription Department, Freepost 38, London W1E 6QZ. No stamp required.





# DISKING

means business

**DISKING**, FREEPOST, Liphook, Hampshire, GU30 7BR. Tel (0428) 722563 (24hrs)

## Unlabelled diskettes + FREE coloured diskette(s)

**SEE 10  
LIBRARY BOX**  
(capacity ten disks)



**FREE**

with  
Deals

**A,F,L,R**

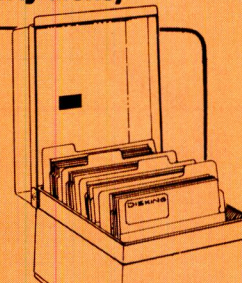
**BUDGET 30  
STORAGE BOX**  
(capacity thirty disks)



**FREE**

with  
Deals  
**B,G,M,S  
C,H,N,T**

**BUDGET 50  
STORAGE BOX**  
(capacity fifty disks)



**FREE**

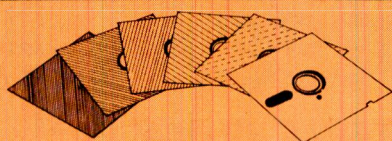
with  
Deals  
**D,J,P,U  
E,K,Q,V**

### Diskettes

Prices exc VAT — All diskettes individually certified & with hubbrings

	10+1 colour	20+2 colours	30+3 colours	40+4 colours	50+6 colours
1D S/S D/D 48 tpi	Deal A 15.90	Deal B 31.80	Deal C 47.70	Deal D 63.60	Deal E 79.50
2D D/S D/D 48 tpi	Deal F 17.90	Deal G 35.80	Deal H 53.70	Deal J 71.60	Deal K 89.50
1DD S/S D/D 96 tpi	Deal L 17.90	Deal M 35.80	Deal N 53.70	Deal P 71.60	Deal Q 89.50
2DD D/S D/D 96 tpi	Deal R 19.90	Deal S 39.80	Deal T 59.70	Deal U 79.60	Deal V 99.50

## ALL DEALS GET:



\* Choose from the following Colours:-  
Red (R), Orange, (O)  
Yellow (Y), Green (G),  
Pale Blue (P), Blue (B)

● Circle No. 143

UK shipping rates inc ins.  
but exc. VAT

Deals:- A,B,F,G,L,M,M,R,S  
1-2 off £1.00 each, 3-5 off 80p  
each 6-9 off 60p each, 10+ off  
POST FREE

Deals:- C,D,E,H,J,K,N,P,Q,T,U,V  
1-2 Off £2.00 each, 3-5 off £1.40  
each 6+ POST FREE

**FREE storage box**  
**FREE coloured diskette(s)\* of your choice**  
**FREE Pack of Disking Colour Coder Felts**  
**FREE Blue Diskwriter Pen**  
**FREE Black Diskwriter Pen**

Please rush me the following Deal(s):-

Qty	Deal	Colour(s) required	Price exc VAT
_____ x	_____	_____	_____
_____ x	_____	_____	_____
_____ x	_____	_____	_____

Total goods value exc VAT

Total delivery & insurance

Sub Total exc VAT

VAT

Value of cheque to Disking

Name: \_\_\_\_\_

Address: \_\_\_\_\_

tel No: \_\_\_\_\_

or please charge my credit card No: \_\_\_\_\_

Access VISA & Diners cards welcome



We are main distributors for Verbatim, Memorex, Dysan and Maxell diskettes, and we sell all diskette accessories including storage boxes and cleaning kits — please telephone for price list.



# DISKING

## means business

**DISKING FREEPOST, LIPHOOK, HAMPSHIRE GU30 7BR, UNITED KINGDOM**

How to contact us:

General Enquiries & Sales (0428) 722563; Trade/Government (0428) 722840; Telex 858623 Telbur G

**DISKING  
NEWS**

### THE DISKING PROMISE.

If you don't find us the slickest diskette supplier in the world, or if you have ANY reason to be unhappy with our products OR services in ANY way — we want to know. After all we are here to serve you, and if you're not happy — we're not happy. We continuously strive for perfection, and everything you see here is IN STOCK and ready to be shipped within four hours (YES, HOURS!). A full refund if dissatisfied goes without saying.

### NEW FROM DISKING.

To brighten up your office desk, just pick up the 'phone and order your very own SUPERB Colour Coded diskettes. We have RED, ORANGE, YELLOW, GREEN, PALE BLUE and BLUE. They are packed in fives of one colour, and come with a FREE SEE 10 Library Box, and pack of Colour Coders. So before you erase the wrong disk or accidentally leave the master disk out in the dusty environment — COLOUR CODE THEM!

### THE DISKING BD (British Disease) AWARD.

Our BD award this week for another useless company, goes to Corralls (Powell Duffryn Fuels Ltd), who, when asked for an urgent delivery of heating oil that we required, answered "We cannot give you a delivery time, and we cannot give you a price, I'm only here to take orders". If any of you out there understand that, we'd love to hear from you?

## DISKETTES

### Maxell — The Gold Standard

#### 5 1/4" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
MD1-D S/S 48 tpi	23.90	22.90	21.90
MD2-D D/S 48 tpi	34.90	33.90	32.90
MD1-DD S/S 96 tpi	34.90	33.90	32.90
MD2-DD D/S 96 tpi	42.90	41.90	40.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

#### 8" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
FD1-XD S/S D/Dens	32.90	31.90	30.90
FD2-XD D/S D/Dens	40.90	39.90	38.90

32 hard sector available at the same prices.

#### 3 1/2" Microdisks

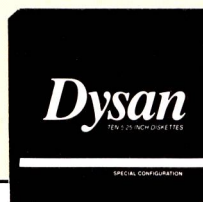
Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
MF2-DD D/Sided 1.0Mb	59.90	58.90	57.90

#### 3" Microdisks

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
CF2 Compact D/S Floppy	39.90	38.90	37.90



### Dysan for the Discerning

#### 5 1/4" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
104/1D S/S 48 tpi	23.90	22.90	21.90
104/2D D/S 48 tpi	34.90	33.90	32.90
204/1D S/S 96 tpi	34.90	33.90	32.90
204/2D D/S 96 tpi	42.90	41.90	40.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

#### 8" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
3740/1D S/S D/Dens	32.90	31.90	30.90
3740/2D D/S D/Dens	40.90	39.90	38.90

32 hard sector available at the same prices

### MEMOREX

### Memory Excellence

#### 5 1/4" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
3481 S/S 48 tpi	22.90	21.90	20.90
3491 D/S 48 tpi	29.90	28.90	27.90
3504 S/S 96 tpi	28.90	27.90	26.90
3501 D/S 96 tpi	36.90	35.90	34.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

#### 5 1/4" Diskettes (HIGH DENSITY)

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
5500 D/S 1.6 MByte	49.90	48.90	47.90

#### 3 1/2" Microdisks

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
6100 S/Sided 0.5Mb	42.90	41.90	40.90

### DataLife

### Verex

### Verbatim Datalife = Best!

#### 5 1/4" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
MD 525-01 S/S 48 tpi	22.90	21.90	20.90
MD 550-01 D/S 48 tpi	29.90	28.90	27.90
MD 577-01 S/S 96 tpi	28.90	27.90	26.90
MD 557-01 D/S 96 tpi	36.90	35.90	34.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

#### 8" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
FD 34-9000 S/S S/D	31.90	30.90	29.90
FD 34-8000 S/S D/D	31.90	30.90	29.90
DD34-4001 D/S D/D	36.90	35.90	34.90

32 Hard Sector available at same price.

#### 3 1/2" Microdisks

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
MF350 S/Sided 0.5Mb	42.90	41.90	40.90

### Verbatim Verex = Value

#### 5 1/4" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
MD200-01 S/S 48 tpi	19.90	18.90	17.90
MD250-01 D/S 48 tpi	23.90	22.90	21.90

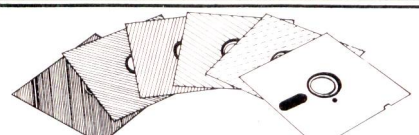
48 tpi suitable for 35 or 40 track operation.

#### 8" Diskettes

Prices and quantities relate to Ten-Packs

Prices exc VAT	1-4	5-9	10+
FD34-1500 S/S S/D	22.90	21.90	20.90
DD34-1501 D/S D/D	29.90	28.90	27.90

32 Hard Sector available at same price.



### coloured diskettes

#### 5 1/4" Supplied in Five-Packs of one colour

Prices and quantities relate to Five-Packs

Prices exc VAT	1-9	10-19	20+
1D S/S 48 tpi	12.90	11.90	10.90
2D D/S 48 tpi	18.90	17.90	16.90
1DD S/S tpi	18.90	17.90	16.90
2DD D/S 96 tpi	21.90	20.90	19.90

To order the colour of your choice, just precede the type number with the appropriate letter. (R) RED, (O) ORANGE, (Y) YELLOW, (G) GREEN, (B) BLUE & (P) PALE BLUE. For the actual colours, please see our full colour advertisement back a couple of pages, or call and ask for our full colour brochure.

## FREE!

### LCD TABLE CLOCK

worth  
**8.95**



### with EVERY 20 Diskettes ordered at these prices

When you buy twenty diskettes (any size, make or type) at these prices, you will receive, completely FREE of charge, this superb calendar clock with a large easy to read 24mm LCD display. Buy forty diskettes and you will receive two clocks and so on.

Offer ends 30th April, 1985

FREE with every Ten-pack of diskettes from DISKING (or Five-Packs if coloured disks). The Superb SEE 10 Library Box. Also available individually for £2.50 exc VAT, either for 5 1/4" Disks

(SEE 10), or 3 1/2" Disks (SEE 10-3). Now also available for 8" Disks (SEE 10-8) at £3.00 exc VAT.

### PLUS FREE DISKING Colour Coders

A multicoloured pack of ten fibre tipped pens for colour coding your diskette labels. Available individually at 49p exc VAT.



## BARGAIN CORNER

### Bargain Corner Diskettes 5 1/4" Diskettes

Complete with a FREE SEE 10 library box and Colour coders, these disks are certified and are from one of the manufacturers in this ad

Prices and quantities relate to Ten-Packs

Exc VAT (No hub ring)	1-4	5-9	10+
UL1D S/S 48 tpi	13.90	12.90	11.90
UL2D D/S 48 tpi	20.90	19.90	18.90
UL1DD S/S 96 tpi	20.90	19.90	18.90
UL2DD D/S 96 tpi	24.90	23.90	22.90

Suitable for single OR double density.

Exc VAT (With hub ring)

	1-4	5-9	10+
UL1DHR S/S 48 tpi	14.90	13.90	12.90
UL2DHR D/R 48 tpi	21.90	20.90	19.90
UL1DDHR S/S 96 tpi	21.90	20.90	19.90
UL2DDHR D/S 96 tpi	25.90	24.90	23.90

Suitable for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.



# DISKETTE STORAGE



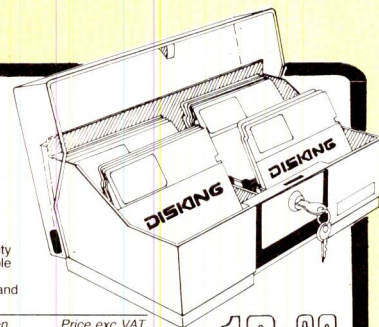
**Budget 30**  
30 Minidisk capacity in smart beige brown complete with five coloured dividers.

Part No	Description	Price exc VAT
B30	30 Minidisk capacity	5.90

If buying 3 to get one FREE p&p @ 4 unit rate please

**Buy 3 of a kind and get the 4th one FREE**

**POPULAR**



**Jumbo Swinger**  
A massive 120 minidisk capacity (with arms removed). Adjustable arms compensate for less diskettes, complete with keys and carrying handle.

Part No	Description	Price exc VAT
JUMBO	100 + Minidisk capacity	18.90

If buying 3 to get one FREE, p&p @ unit rate please.

**18.90**

## Disking Swing-Lid Lockable Box

60 Minidisk capacity, complete with keys, dividers, tags and even built in carrying handles.

Part No	Description	Price exc VAT
DSL B	60 Minidisk capacity	17.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

**17.90**

**BUDGET RANGE**

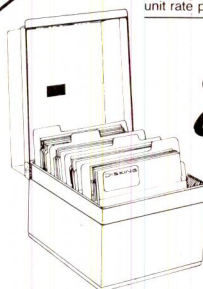
## Budget Micro

30 Microdisk capacity (or 12x3" disks). Smart two-tone beige brown.

Part No	Description	Price exc VAT
BM	30 Microdisk capacity	6.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

**6.90**



## Budget 50

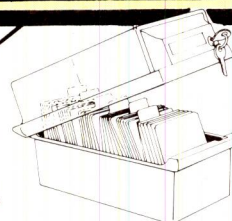
50 Minidisk capacity in smart two-tone brown, complete with four dividers and non-scratch rubber feet.

Part No	Description	Price exc VAT
B50	50 Minidisk capacity	8.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

**8.90 Great Value!**

**EXECUTIVE**



**19.90**

## Executive Range

The ultimate in quality. Luxurious two-tone brown, with dividers, tabs, keys, removable lids — you name it!

### Executive Micro 50

Fifty 3.5" microdisk capacity complete with removable lid, dividers, tabs, lock and 2 keys.

Part No	Description	Price exc VAT
EM50	50 microdisk capacity	19.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

**22.90**

## Executive Mini 100

100 5.25" minidisk capacity complete with removable lid, dividers, tabs, lock and 2 keys.

Part No	Description	Price exc VAT
EM100	100 minidisk capacity	22.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

## DISKING supermailers

These diskette mailers come packed in 100s and are of a very clever copyright design. They will hold up to 4 diskettes complete with envelopes and are extremely robust.

Part No	Description	Price exc VAT
DSM 100	Supermailers	24.90

**NEW**

## Memorex Cleaning Kits

The latest computer care range from Memorex represent fantastic value for money, and are available individually or with a discount if purchasing all three.

**Buy all three kits together, and we will reduce the total price from £18.70 to £14.90 SAVING £3.80 — A BARGAIN IF EVER WE SAW ONE!**

Part No	Description	Price
MKEY	Case/keyboard cleaning kit	4.90
MTV	VDU screen cleaning kit	4.90
MDD	Disk drive head cleaning kit	8.90

**MEMOREX**

**MEMOREX**

**COMPUTER CARE**



## Postage and Packing Rates

### UK Shipping Rates exc VAT

#### 5 1/4" Disks or microdisks

1-2 packs each pack @ 95p  
3-5 packs each pack @ 75p  
6-9 pack each pack @ 60p  
10+ packs POST FREE

#### 5 1/4" Coloured Diskettes

1-3 5-packs 50p each pack  
4-9 5-packs 30p each pack  
10+ 5-packs POST FREE

### 8" Diskettes

1-2 packs each pack @ 1.60  
3-5 packs each pack @ 1.20  
6-9 packs each pack @ 90p  
10+ packs POST FREE

#### Budget Storage

1 off £1.00 each  
2-7 off 70p each  
8+ off POST FREE

#### Lockable Storage

1 off £2.00 each  
2-7 off £1.30 each  
8+ off POST FREE

#### All 'SEE 10' Library Boxes

1-4 off @ 40p each  
5-9 off @ 30p each  
10+ off @ 20p each

#### Disking Diskwriters

50-pack £1.00

#### Disking Colour Coders

1-5 packs 25p per pack  
6+ packs POST FREE

#### Disking Supermailers

100-pack £3.00

#### Memorex Cleaning Kits

1 off 60p each  
2-7 off 40p each  
8+ POST FREE

## TRADE CORNER

### FREE Aeroplane

Our latest aeroplanes have sound, so you'll have no trouble waking up those sleepy software engineers, when you throw it at them. Just call and ask for our flier, and we'll send you our latest trade pack with prices, special offers and sample unlabelled diskette. We'll also enclose a DPC (Disking Priority Customer Card) application form telling you how to buy at our 10,000 prices yet order in 50's.



## How to Order:



General Enquiries & Sales: (0428) 722563  
Government & Trade Sales: (0428) 722840

**If in doubt at ANY time, just call and ask for Joan. She will answer any questions that you may have, even if you only want a catalogue and order form, just CALL!**

### Official Government Orders Welcome

We supply all Government bodies including schools, Universities, Colleges, Hospitals, the Utilities, Research Establishments, Armed Forces, the Ministries and Local Authorities world-wide. We will despatch within 4 (YES, FOUR) working hours from receipt of your official order number received either by post or by telephone and all orders are handled in the strictest confidence and to the letter. All other customers, cheque with order please payable to DISKING. If you are a large establishment and cannot raise cheques without an invoice, please post or telephone your order, and we will send a pro-forma invoice by return for your accounts department to pay against.

### Credit Card Orders (0428) 722563 (24hr)

FREE DISKING logobug for all orders left on the answering machine. You may call 365 days a year, 24 hours a day, and you may speak for as long as you like when you leave the following details:  
1. Day-time telephone number  
2. Cardholder name and address  
3. Delivery (or invoice address) if different  
4. Your Credit Card Number  
5. What you want and how many  
6. Normal or first class post  
We welcome Access (Mastercharge) Barclaycard (VISA) and Diners Club International, and there is NO credit card surcharge. Alternatively you may write your credit card number on your order.

### Leave the REST to US!

#### Urgent Orders

If you are posting your order, leave out the word FREEPOST from our address, and use our normal post code GU30 7EJ and do not forget to stamp it First Class. If you are telephoning your order, please make it clear that your wish to pay for your goods to be sent to you by First Class Post.

#### First Class Rates

Minidisks & Microdisks:  
First Ten-Pack, £2.00. Second and subsequent Ten-Pack, £1.50.

#### Very Urgent Orders

If ordering by telephone, and by 3.00pm you may request Datapost which delivers the next morning at 9.00am. Minimum cost is £10.00 for the first 5kg — please call.

#### Desperate Orders

Just call and ask for Joan or Roger and we will do whatever we can to help you with your problem. If you are not too far we can probably organise a taxi or courier.







## ***DOES WORKING ON LOTUS 1-2-3 MAKE YOU SEE RED?***

Granted, Lotus 1-2-3™ can be a fast spreadsheet.

Except when you first buy it, take out the five floppy disks, study the manual to figure out which ones do what, put the plastic Thingymejig over the keyboard, and begin reading about all the installation procedures you need to get the thing up and running.

Or if you never make a circular calculation (any simultaneous equation, even something as simple as "bonus equals 10% of profit after bonus") when doing a complicated spreadsheet.

By the time 1-2-3 calculates it correctly, you may have retired.

Or if you'd like to plot your data with a single keystroke, because it can take several minutes (including a disk change) just to start the process.

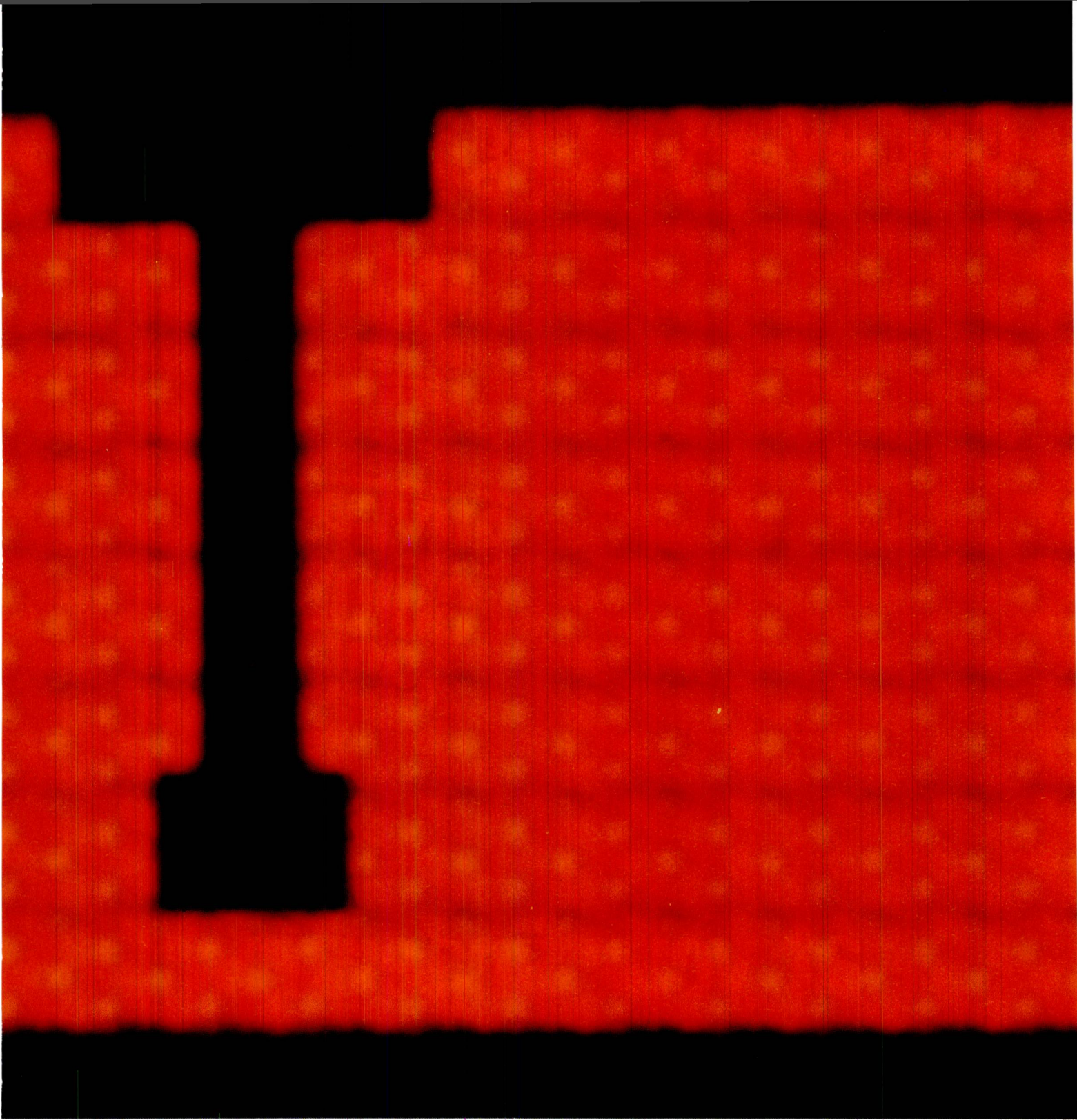
Or if you'd like to quickly create a file directory under program control. 1-2-3 can't do that at all.

What's the point of all this?

We'd like you to go down to your software dealer or send for a free demo-disk and see a new product called SuperCalc® 3 Release 2, which, unlike Lotus 1-2-3, does all of the above.

Along with a larger spreadsheet. Vastly superior graphics. Incredible speed (that becomes even faster when used with the 8087 or 80287 math co-





processors, which 1-2-3 doesn't support). And more.

For a lot less money.

All on one disk that you can run right out of the box. (Our lawyers want you to know we include an additional file disk. Which also contains the popular printing program Sideways™, so you'll never have to cut and paste wide printed reports together again. Unless you use 1-2-3.)

But don't believe us about all this. Go take a look.

After you do, one thing should become obvious.

What are you waiting for?



## **SORCIM / IUS MICRO SOFTWARE**

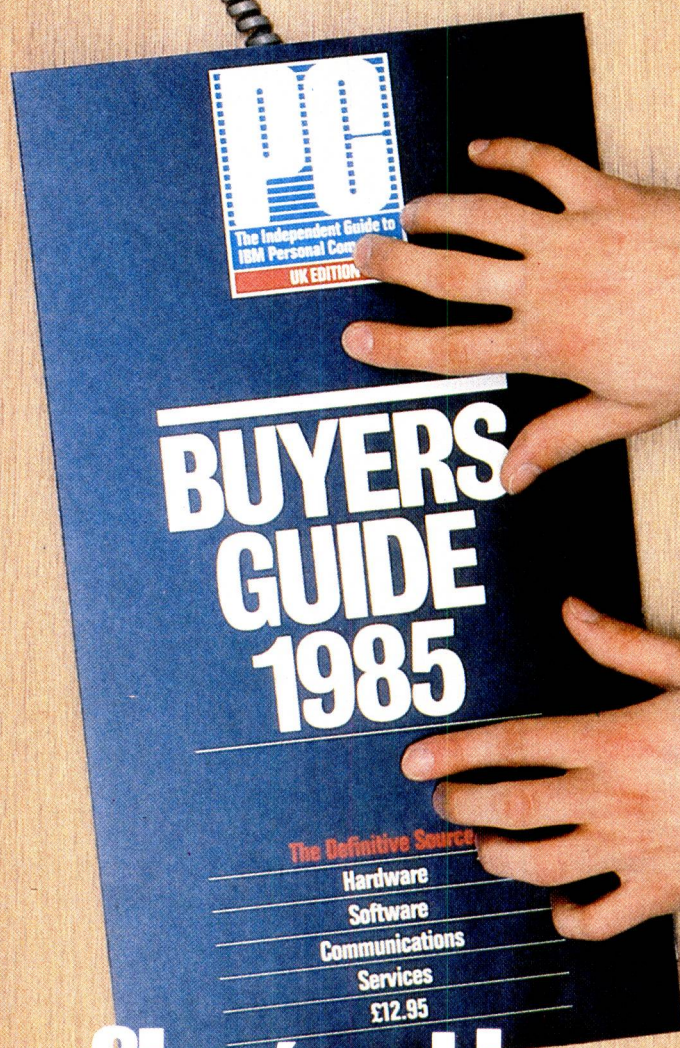
A Division of Computer Associates International, Inc.

St. Mary's House, 16-20 High Street,  
Maidenhead, Berkshire. SL6 1QH.

Telephone: (0628) 70911 Telex: 847268



# Get everything for your PC



# at your fingertips

In the fast growing PC world, it's easy to lose track of what's available, what's new and what's best to buy for your Personal Computing.

PC magazine's unique PC Buyers Guide gives you the most up-to-date facts about all the IBM PC and PC compatible hardware, software, communications and services you'll ever need. To hand right on your desk top.

Comparisons between IBM and the look-alikes, details on over 800 software products, indexed information on more than 1,000 suppliers, comprehensive dealer listings — they're all in PC Buyers Guide. Plus helpful features on identifying and assessing your needs. Price information is also included.

The 1985 PC Buyers Guide is invaluable. Take advantage of the special pre-publication deal now, while it's at your fingertips . . .

VNU Business Publications PC Buyers' Guide  
London W1E 3YZ

Please send me a copy of the PC Buyers' Guide, 1985. I enclose a cheque/postal order for £10.95 (inc. postage and packing), payable to VNU Business Publications BV.

Name

Position

Company

Address

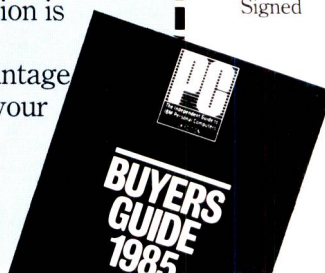
PCW 6 85

Signed  Date

Post to:

VNU Business Publications BV  
PC Buyers' Guide  
FREEPOST 32  
London W1E 3YZ

No stamp required





# The 'Classic' Menu Generator.

**E**liminate all user contact with operating system commands. Use **MENUGEN** from Microft Technology to create menus to access all your regularly used programs.

**MENUGEN** is a utility which will create menus for any activity. A menu selection will run a program, call another menu, return to a previous menu, run a basic program, execute operating system commands, or exit to the operating system.

## FACILITIES INCLUDE

UP TO 16 MENU OPTIONS PER MENU SCREEN

UP TO 15 LEVELS OF NESTED MENU

OPTIONAL PASSWORD PROTECTION ON MENU SELECTIONS · OPTIONAL LOGGING OF ALL SELECTIONS TAKEN

**MENUGEN** is available for most micros with one of either the CPM or MSDOS family of operating systems, including IBM PC and compatibles, Sirius, Apricot and many Z80 machines. **MENUGEN** costs £48 + VAT (£55.20) for a single user licence, or £120 + VAT (£138) for a network licence, and is available from Microft Technology Limited, The Old Powerhouse, Kew Gardens Station, Kew, Surrey TW9 3PS. To order, or for further information, telephone 01-948 8255.

## MENUGEN

MENUGEN is a Trade Mark of Microft Technology Limited and is a British product.

User Ltd. Selection Menu

- 1 ASPECT
- 2 Wordstar
- 3 Lotus 123
- 4 Disk formatting menu
- 5 Exit to operating system

Please type in selection number

## olivetti M24

Compatible & faster  
than IBM PC



### SAMPLE SYSTEMS

Integral Hard Disk, 1 x 360K Disk Drive Monochrome Display, Keyboard, Bus Converter (7 Slots) and MSDOS.

PRICES FOR SYSTEMS WITH

**20MB** Integral Hard Disk **£2875**

**10MB** Integral Hard Disk **£2790**

All systems include Graphic Display serial and Parallel Interfaces.

## 01-453 0123

### T.F.H. COMPUTERS

6 Sunbeam Road, Park Royal NW10

# CROCKER COMPUTER AUCTIONS

**NEXT LONDON SALE — 13 JUNE AT 6.30pm**

**Bonnington Hotel, Southampton Row WC1**

**Viewing 12 — 6**

*Entries include:*

IBM PC, Apricot PC, Apple computers and peripherals, substantial numbers of Apple add-on cards.

Various makes of printers. Complete new Brain system including disk drives. Other entries include Dragon, Oric, Atari, Sinclair.

Quantities of diskettes on offer.

Entries close 3 June —

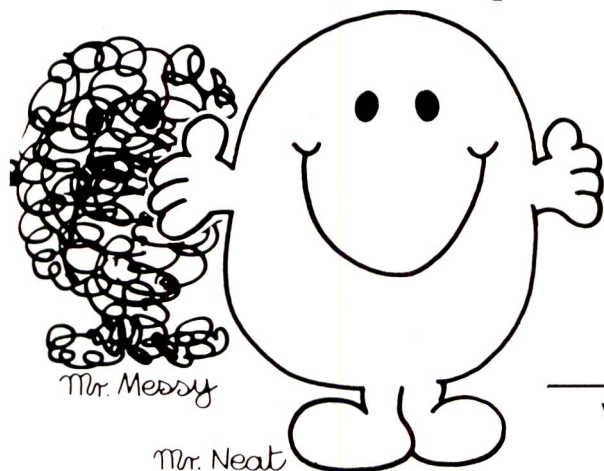
**Ring 01-580 0977**

## CROCKER COMPUTER AUCTIONS

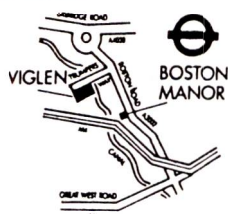
**QUEEN'S YARD — OFF TOTTENHAM COURT ROAD, LONDON W1**



# Thanks to **Viglen** and the Olivetti Personal Computer I'm a changed man.



Open 9.30-6.00 weekdays,  
9.30-4.00 Saturdays



If you want to run your business more efficiently you need the Olivetti M24 Personal Computer. It's fully compatible with the IBM PC (the accepted standard), giving you access to the most popular software.

Performs quicker, giving a sharper, clearer image, with 16 shades of grey. Also having a tiltable, rotatable screen.

To hear about the M24's other unique features call in and see us. You'll find Olivetti have made quite a few changes.

## Viglen

IBM is the registered trade mark of International Business Machines.

Unit 7, Trumpers Way,  
Hanwell W7 2QA.  
Telephone: 01-843 9903

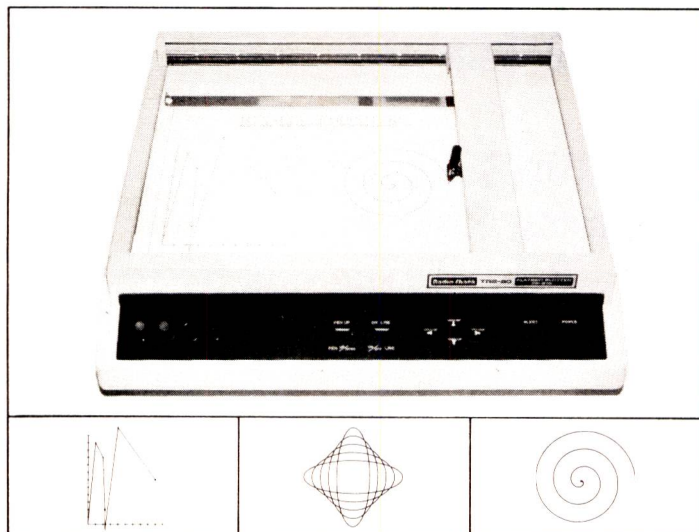


For the most competitive prices on micro computers and peripherals. Complete word processing and accounting systems available. Please call, or come and see us at our showroom.

Viglen is a major supplier to government and educational establishments, and welcomes further enquiries and orders.

## olivetti

# BIZZELL'S BLOCKBUSTER BARGAINS



HIGH SPEED, HIGH QUALITY, FOUR COLOUR, FLATBED.

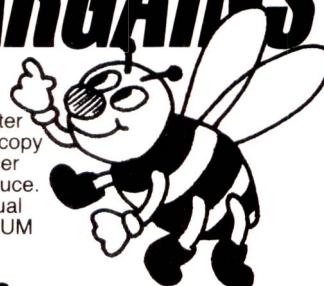
## PRINTER/PLOTTER Only £399

- Prints horizontally or vertically in text.
- Prints four directions and 255 sizes in graphics.
- Plotting area 298x216 mm.
- Plotting speed 100mm/sec.
- Step size 0.1mm.
- Self test and auto functions.
- Red, Green, Blue and Black.
- Parallel and RS232C interfaces.
- Full guarantee.
- BASIC ASCII command codes and parameters.
- Full manual (cassette and commands for BBC Micro).

Ideal for graphs, drawings, symbols, axes, geometric patterns, charts, diagrams, circuits, computer art, flowcharts, 3-D, contours etc.

## RD DIGITAL TRACER

Produce illustrations on your computer simply and easily using the tracer to copy existing material. Simply run the tracer head over anything you want to produce. Complete with full instructions, manual and software. BBC £69.95 SPECTRUM £59.50



## MIDWICH DISC DRIVES

400k, Double Sided, 40/80T switchable.  
Single drive £175  
Dual drive £295

## UCHIDA DWX 305

Daisywheel printer £295

## LEADS

Printer/Plotter £10  
I.E.E. to Centronic with interface £40  
Parallel to Centronic with interface £30

## TEACHERS AND PARENTS

Send for FREE educational software catalogue covering all ages from pre-school to 'A' level. All programs listed and described. All prices include VAT and delivery. UK mainland. Access card holders can ring to place order. Write with order and cheque (stating computer) to:

**BIZZELL COMPUTERS**  
WALNUT TREE HOUSE,  
FORNCETT ST. PETER,  
NORWICH NR16 1HR.

PERSONAL CALLERS WELCOME (10.00-5.00) Phone for appointment (095389-592)

SEE US AT



25th-28th July 1985  
Barbican Centre  
London EC2



## THE SECRET OF ST BRIDES

St Brides school, where grown up girls can experience old fashioned school girl life.

Last year it hit the headlines in a flurry of controversy.

★ "A school for scandal?" asked the Daily Telegraph.

★ "All very puckah" assured BBC TV NEWS.

★ "Creepy" shuddered the Mail colour supplement.

What is the secret of Saint Brides? Now you can find out for yourself. Explore the dormitories and classrooms — but don't get caught! Find your way to the forbidden underground passages. Meet the things that lurk there. Pass through the Time Warp and finally discover . . .

### The secret of Saint Brides

A schoolgirl adventure with a difference. Full of twists and surprises — exciting, funny, musical with full supporting packets.

For C64 Spectrum, cassette only.

**£6.95 or £5.95** if you order direct from:-

**Saint Brides School (PW)**  
Burtonport  
County Donegal  
Ireland

(Direct price includes P&P)

Please rush me the Secret of Saint Brides  
I enclose £5.95

Name.....

Computer.....

Address.....

Telephone: Burtonport 30

## RSD Connections Ltd

MONITOR LEADS		RIBBON CABLE (Price per ft)		34-way		40-way		50-way		60-way	
BBC to Microvitec	£2.20	9-way	Grey Rainbow	£3.10	£1.95	£1.60					
TV to Computer	£1.25	10-way		£3.40	£2.00	£1.85					
Green Screen	£2.95	14-way		£3.85	£2.25	£2.00					
BBC to Fidelity etc	£4.95	15-way		£4.80	£2.60	£2.25					
QL to Fidelity etc	£4.95	16-way		<b>SPECTRUM EXTENSION LEADS</b>							
COMMODORE to Fidelity etc	£4.95	20-way		6 inch extension cable M to F							
Phono to Phono	£1.25	24-way		6 inch F to 2Ms							
BBC to Ferguson	£2.50	25-way		12 inch extension cable M to F							
QL to Microvitec	£2.50	26-way									
QL to mono monitor	£1.50	34-way									
BBC to Sony/Kaga	£5.95	37-way									
BNC to BNC	£2.95	50-way									
COMMODORE to Ferguson	£2.50	60-way									
BBC to Hitachi	£2.50	64-way									
SONY to Fidelity etc	£6.50										
MSX to Ferguson	£2.50										
QL to Ferguson	£2.50										
IDC AMPHENOL		EDGE CONNECTORS		IDC SHROUDED HEADERS		WITH EJECTING		LOCKING ARMS		Straight Right Angle	
36-way plug	£4.95	2 x 23-way (ZX-81)	£1.85	10-way	85	90				10-way	85
36-way socket	£5.95	2 x 28-way (Spectrum)	£2.10	14-way	£1.00	£1.20				14-way	£1.00
DISK DRIVE LEADS		DOUBLE SIDED PLUG		16-way	£1.25	£1.45				16-way	£1.25
Dual disk drive power lead	£4.50	ZX-81 23-way	£1.25	20-way	£1.40	£1.60				20-way	£1.40
Dual disk drive lead 1m	£10.25	Spectrum 28-way	£1.50	26-way	£1.70	£1.95				26-way	£1.70
Single disk drive power lead	£2.75			34-way	£2.00	£2.30				34-way	£2.00
Single disk drive lead 1m	£7.25			40-way	£2.15	£2.45				40-way	£2.15
Disk drive extn. lead 1m	£7.25			50-way	£2.30	£2.65				50-way	£2.30
CASSETTE LEADS				60-way	£2.45	£2.85				60-way	£2.45
BBC to cassette	£2.25										
DRAGON to cassette	£2.20										
SPECTRUM to cassette	£1.25										
BBC to Acorn cassette	£2.25										
PRINTER LEADS											
ALL 1 METRE LENGTH											
BBC	£9.95										
BBC serial	£8.95										
AMSTRAD	£16.95										
MEMOTECH	£12.75										
EINSTEIN	£12.75										
IBM PC	£15.75										
SPECTRUM interface	£9.75										
to RS 232	£15.25										
ATARI	£13.95										
MSX	£15.20										
APRICOT	£9.95										
DRAGON	£10.75										
QL											

**TRADE ENQUIRIES WELCOME**  
75p P&P IN UK. Access & Visa accepted. Add 15% VAT to all orders  
Cheques made payable to  
**RSD Connections Ltd, Dept PC6**  
PO Box 1, Ware, Herts.  
Tel: 0920 5285

## COMPUTERINE



**ITALIAN FURNITURE**  
**GAGLIARDI**

Gt Britain — Switzerland — Italy — U.S.

- SEAT HEIGHT AUTOMATICALLY ADJUSTABLE
- COMPRESSED AIR ACTION
- BACK REST ADJUSTABLE, BOTH IN HEIGHT AND ANGLE
- EASY SPRING ACTION

**£115 plus P&P**

509 KINGS ROAD, CHELSEA  
LONDON SW10 0TX  
Tel: 01-352 3663 Telex: 888142

## SHARP MZ-7000

# S.U.N.

**SHARPSOFT USER NOTES** are published three times a year and are totally dedicated to the MZ700. They contain program listings, editorial articles, readers letters and plenty of tips and hints on using the MZ700.

**SOFTWARE** Sharpsoft have the finest range of programs for the MZ700 from machine code arcade action games to programming aids, utilities and business applications.

**HARDWARE** We specialise in all peripherals and accessories necessary for expanding your MZ700 system: Printers, Disc Drives, Hi-Res Graphics, Interfaces, Cables, Pens, Paper Rolls, Monitors etc . . .

**SHARPSOFT 'WITH THE SHARP USER IN MIND'**

Please send me:

☐ USER NOTES '84 (UK) £3.00 ☐ USER NOTES '84 (OVERSEAS) £6.00

Please join me for:

☐ USER NOTES '85 (UK) £3.50 ☐ USER NOTES '85 (EUROPE) £6.00

☐ USER NOTES '85 (OVERSEAS) £7.50

☐ Please send me more information on HARDWARE and SOFTWARE.

I own MZ711, MZ721, MZ731 (Please delete).

I enclose a Cheque/P.O. for £ \_\_\_\_\_ Access/Visa \_\_\_\_ / \_\_\_\_ / \_\_\_\_.

Name: \_\_\_\_\_

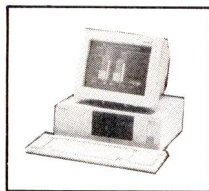
Address: \_\_\_\_\_

**SHARPSOFT LIMITED, 86-90 Paul Street, London EC2A 4NE**  
Tel: 01-739 8559



# · VALUE · VALUE · VALUE ·

## ERICSSON



### THE IBM COMPATIBLE P.O.A.

The recently launched ERICSSON PC is now available from Wolfcrown. It is exceptionally IBM compatible with extra features at a significantly lower price. On site 12 months warranty included with nationwide Ericsson backup. Standard configuration includes 128Kb, serial and parallel ports, six expansion slots, ergonomic amber monitor and splendid graphics. According to *PC USER* "At 90% of whatever the current price of the IBM PC happens to be, it's an index linked bargain."

## ALPHA MICRO

**MULTI-USER 10Mb WINCHESTER  
MULTI-TASKING VCR BACKUP  
UP TO SIX USERS SOFTWARE INC.**

The AM1000, the smallest machine in the range is based on the MC68000 and supports two users, expandable up to six, and is available in various configurations up to 40Mb and 1024Kb RAM memory. We are offering a 10Mb system with two word processing screens, operating system, BASIC language Assembler, word processing, over 150 utilities, and accounting software at the remarkable price of £7,250. Extra users can be added at £650 per user.

## IBM COMPATIBLE PC'S

**PC-301 £1,395 + VAT**  
IBM PC compatible with 2x360Kb floppy drives, colour video board and expandable 128Kb multifunction card, 2 serial ports, parallel port, clock/cal and eight expansion slots.

**TOSHIBA PC from £1,795 + VAT**  
The new TOSHIBA PC offers IBM compatibility with a higher specification and bundled software with a value of £700 including Peachpak, wp, spreadsheet etc. 192Kb RAM standard, parallel and serial ports.

## IBM PC BOARDS

Hercules graphics card £315 + £47.25 VAT  
SIGMA multifunction card £245 + £36.75 VAT  
64Kb to 384 Kb RAM, serial/parallel ports, games port, clock/calendar etc.

## PRINTERS & MONITORS

SMITH-CORONA PRINTERS	our price	RRP
Fastext 80.80 col/80cps dot matrix	£170	£195
D100 80 col/120cps dot matrix	£220	£249
D200 80 col/160cps, NLQ, dot matrix	£375	£420
D200 132 col/160cps, NLQ, dot matrix	£535	£595
Daisytype 2000 20cps daisywheel	£239 + £35.85 VAT	
JUKI 6100 18cps daisywheel	£340 + £51.00 VAT	
CP80 80cps dot matrix	£179 + £26.85 VAT	
Riteman Slim-line printer 120cps	£209 + £31.36 VAT	
Philips 12" Green monitor	£79 + £11.85 VAT	

## APPLE COMPATIBLE PRODUCTS

Slim-line disk drive	£125 + £18.75 VAT
Z80 card	£39 + £5.85 VAT
80a column card	£45 + £6.75 VAT
Printer card and cable	£45 + £6.75 VAT
Disk controller card	£35 + £5.25 VAT

Full range of APPLE cards in stock, phone for prices

## TO ORDER

Please telephone order particulars to 01-629 3603 or visit our West End offices on the 1st Floor at 58 Jermyn Street, London SW1Y 6LX.  
Dealer enquiries are welcome.

## PC MULTI-USER BOARD

Why network when you can transform your PC into a multi-user Alpha system supporting up to three screens. Fit the sensational Alpha Micro 170 board into your PC and it operates as a multi-user Alpha Micro PC with access to MS-DOS. On board 128Kb memory, clock/cal, MC68000 processor and full AMOSL operating system and facilities.

£1,500 + VAT

1st FLOOR, 58 JERMYN STREET, LONDON SW1Y 6LX · TELEPHONE 01-629 3603

# · WOLFCROWN ·

ALSO AT PRINCE GROUP, LOMBARD HOUSE, GREAT CHARLES STREET, BIRMINGHAM · TELEPHONE 021-233 2286

60 PCW

## Centronics Parallel Interface for QL\*

**CST announce the Q<sub>π</sub> Centronics Parallel Interface for Sinclair's QL – available NOW for only**

Cambridge Systems Technology can provide the missing link for your QL. The CST Q-PI is a Centronics Parallel Interface offering full Q.DOS device driver software. It will connect your QL to the wide range of printers and plotters which use the standard Centronics interface, and is fully compatible with Sinclair-supplied PSION software.

**£50  
PLUS VAT**

### ORDER FORM

Please send \_\_\_\_\_ Q-PI units @ £86.25 incl VAT £ \_\_\_\_\_  
(and) \_\_\_\_\_ Centronics cables @ £11.50 each incl £ \_\_\_\_\_  
(add post & packing @ £2.25 incl per unit) £ \_\_\_\_\_

CHEQUE/P.O. NO \_\_\_\_\_ REMITTANCE TOTAL £ \_\_\_\_\_

Name \_\_\_\_\_ Address \_\_\_\_\_

Postcode \_\_\_\_\_

Phone \_\_\_\_\_ Date of Order \_\_\_\_\_

CUT AROUND BROKEN LINE AND DESPATCH WITH YOUR REMITTANCE TO:

**CAMBRIDGE SYSTEMS TECHNOLOGY 30 Regent Street Cambridge CB2 1DB**



\*QL IS A TRADEMARK OF  
SINCLAIR RESEARCH LTD.



# The perfect shape for your data



Whatever your requirements, 3", 3.5", 5.25" or 8", we have the perfect shape for you.

Maxell are currently the world's undisputed leaders in floppy disk technology, manufacturing the complete range of magnetic media including the latest microflopsies and the new high density disk for the IBM AT.

Diskxpress is an authorised master distributor for Maxell media and can deliver anywhere in the U.K. within 24 hours.

Ring now for our new price list or complete the coupon below.



## DISKXPRESS

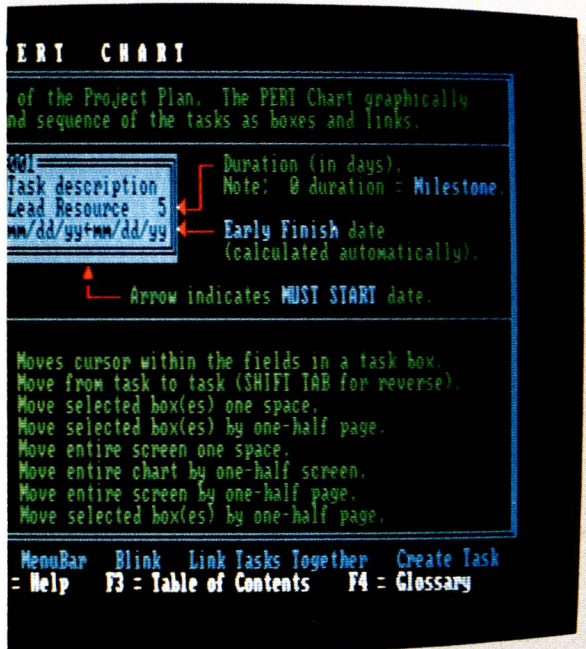
### 01-242 5511

Diskxpress (U.K.) Ltd  
23-24 King's Mews, London WC1N 2JB.

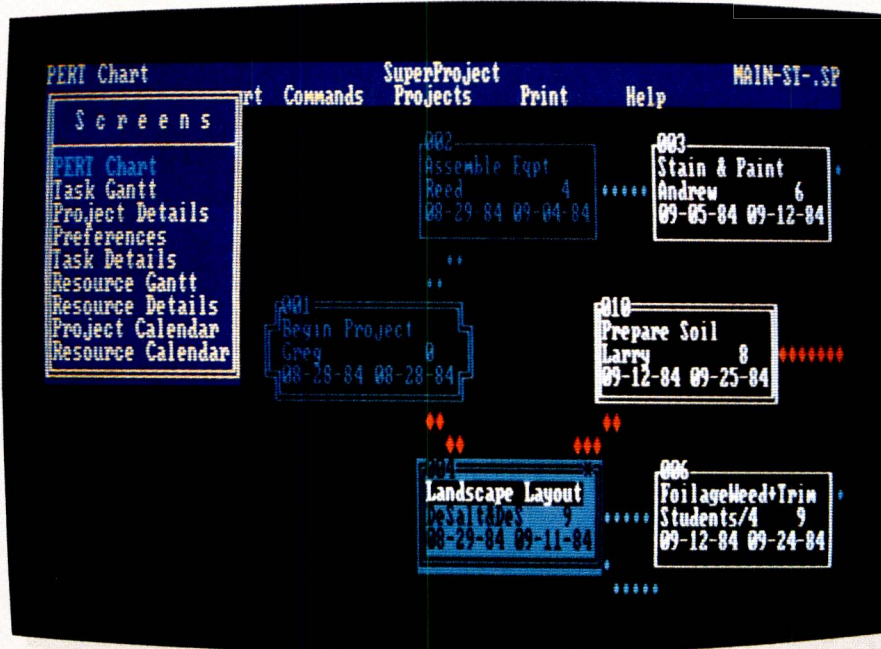
**Telex 295254 DISKX-G**

Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_  
Telephone \_\_\_\_\_ M1





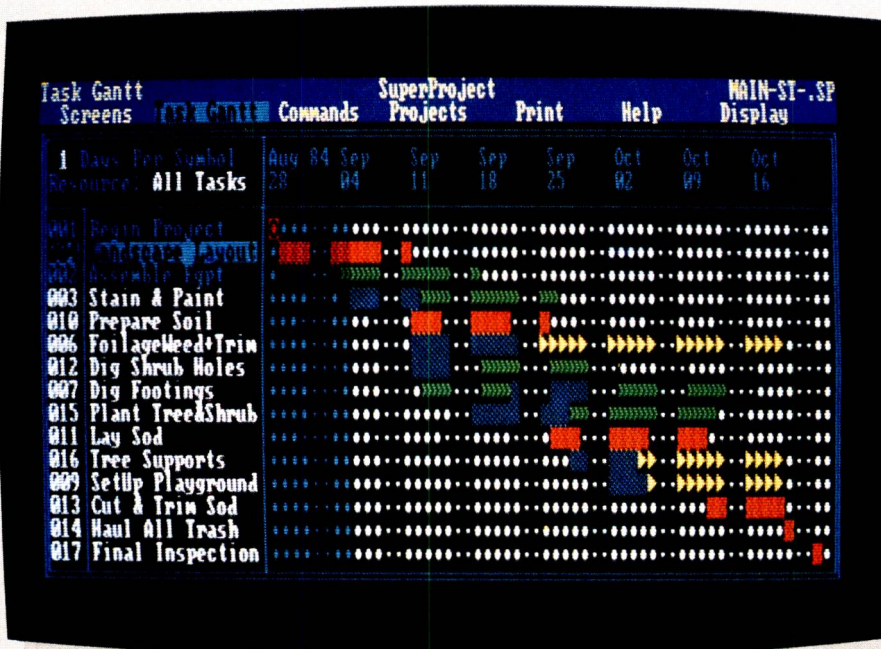
screen help a keystroke away.



Create your entire project on screen.



you see everything on every resource.



Schedule tasks over weeks, months, even years.

## THE DIFFERENCE BETWEEN SUPERPROJECT AND OTHER PROJECT

It's not hard to see why SuperProject is becoming the new standard in project management software.

Bright colours and simple symbols let you know exactly where you stand, and its advanced graphics shine out even on monochrome screens.

But the real beauty of SuperProject lies in what it can do for you.

Like help you plan any project (from the smallest up to a planning problem the size of the Alaska Pipeline) right on the screen. And right to the last detail.

Schedule it seven ways to Sunday, including individual schedules and calendars for every resource.

Budget it down to the last penny, taking into account fixed, variable and total costs.

Have any change you make immediately reflected throughout the entire program.

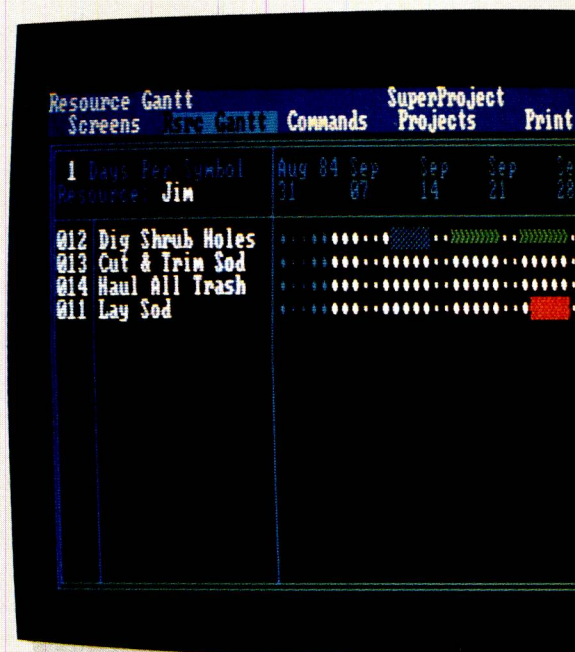
Print every screen, even while you work.

And do it all by following simple menus or by using fast command keystrokes.





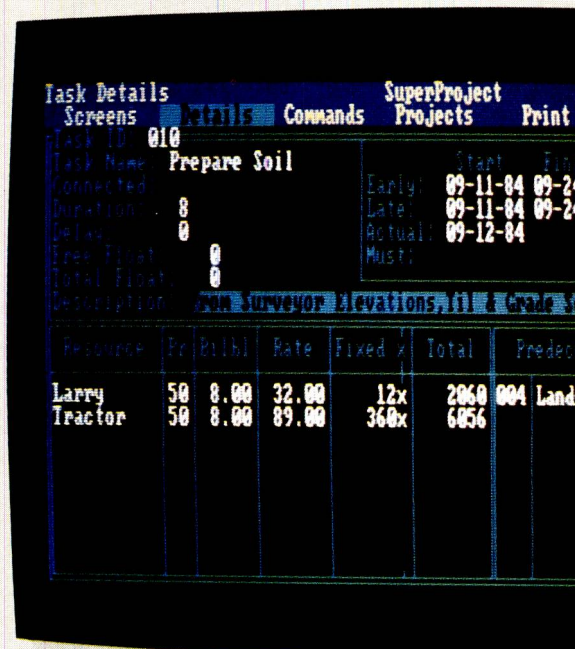
Unique project overview lets you see the big picture.



SuperProject automatically alerts



SuperProject outdates other project calendars by also providing calendars for every resource.



Track fixed, variable, and t

## MANAGEMENT SOFTWARE IS EVEN MORE GRAPHIC THAN THIS.

To take your planning and analysis even further, you can directly transfer project information into SuperCalc 3 Release 2 and other leading spreadsheets, and produce customized reports and charts.

To see how SuperProject can give your project management a clear advantage, visit your Sorcim/IUS dealer or send for a free demo disk. After one look, you'll find it's hard to see yourself using anything else.



# SORCIM/IUS MICRO SOFTWARE

A Division of Computer Associates International, Inc.

St. Mary's House, 16-20 High Street,  
Maidenhead, Berkshire. SL6 1QH.

Telephone: (0628) 70911 Telex: 847268



Until now, if you've wanted to read a magazine about the Apple Macintosh, its software and peripherals, you've been out of luck.

And settling for the odd couple of pages of Macintosh editorial in the general or business computer magazines can be a frustrating compromise.

So you'll be pleased to hear that from July 1st there'll be MacUser, a magazine written and designed specifically for UK Macintosh owners.

MacUser will tell you what's coming, with over-the-horizon previews and "what's new" sections.

MacUser will tell you what's here and whether it's right for you, with page after page of solid, in-depth reviews.

# THE UK'S ONLY MACINTOSH MAGAZINE

MacUser will help you make the most of your Macintosh, with a wealth of "hands on" features, and hints and tips sections.

But we'd like you to find out how good MacUser

is for yourself.

If you're a current Macintosh owner (or if that's your main aim in life!), fill in the reply-paid coupon

and send it off to MacUser Test Drive, SportsScene Publishers Ltd, Freepost 7, London W1E 1EZ.

In return, we'll send you a free "Test Drive" copy of MacUser.

And if you've got a colleague who'd appreciate a copy, fill in their name and we'll be happy to send them a free copy too.

Test drive the premier issue of MacUser now!



## RESERVE YOUR FREE COPY TODAY

I'd like to "test drive" the premier issue of MacUser absolutely free of charge. Please rush me a copy.

- ☐ I am a current Macintosh owner  
☐ I am a potential Macintosh owner

Name .....

Company .....

Address .....

.....

Postcode .....

Telephone .....

I'd like to "introduce a colleague" to MacUser. Please rush a copy to the name and address below.

- ☐ He/She is a current Macintosh owner  
☐ He/She is a potential Macintosh owner

Name .....

Company .....

Address .....

.....

Postcode .....

Telephone .....

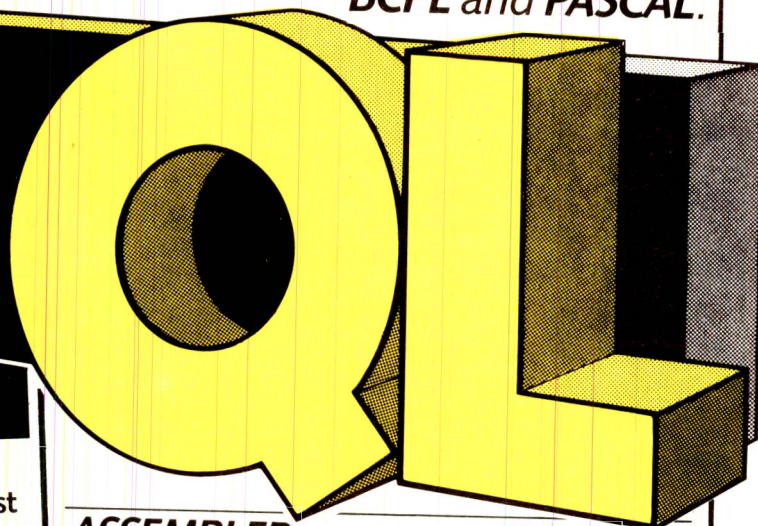
# MacUser

Once you've filled in this coupon for your free "test drive" issue, send it off to **MacUser Test Drive**, SportsScene Publishers, Freepost 7, London W1E 4EZ.



**Write programs to unlock the multitasking power of your QL!**  
 Choose the language you need from Metacomco's unrivalled range  
 of high-quality languages for the QL: The best selling **ASSEMBLER**;  
 The language of the future, **LISP**; and two professional compilers,  
**BCPL** and **PASCAL**.

# RELEASE THE POWER OF THE



**QL PASCAL £89.95**  
INC. VAT

Newly available, a true Pascal compiler for the QL!  
 Developed by Metacomco: leaders in Pascal - the first  
 software house to achieve full ISO validation of a  
 Pascal compiler for the 68000. QL Pascal is a high  
 specification implementation of this popular language,  
 endorsed by Sinclair Research for use on the QL.

- > True compiler producing native 68000 code:  
compact and efficient.
- > Fast, single pass compilation without intermediate  
stages.
- > Conforms closely to ISO 7185 - the international  
standard for Pascal - making it ideal for commercial  
and educational use.
- > Direct addressing of the full QL address space.
- > Key routines provided on ROM for extra speed and  
convenience.
- > No run time licences required for commercial  
applications written using QL Pascal.
- > Any length variable names and full 32-bit integers.
- > Easy to use interfaces to QL windows, graphics,  
screen handling, file operations, etc.
- > Will handle very large sets and  
arrays.
- > Approved by Sinclair Research  
for use on the QL.

**NEW**

The Metacomco Development Kits are  
 available from W.H. Smith, John Lewis,  
 HMV, Menzies, Boots and other leading  
 retailers, or direct from Metacomco.

**METACOMCO**

26 Portland Square, Bristol BS2 8RZ.  
 Tel: Bristol (0272) 428781

QL and QDOS are the trade names of Sinclair Research Ltd.

## ASSEMBLER

**£39.95** INC. VAT

A high specification macro assembler supporting the full  
 Motorola instruction set.

Features: external references; absolute, position  
 independent, and relocatable code; linker; precise error  
 messages; formatted listings; macro expansions;  
 conditional assembly; and a large range of directives.

## BCPL

**£59.95** INC. VAT

A true compiler, ideal for systems programming -  
 writing utilities, games and applications.

Features: generates native 68000 code; run time  
 library includes easy QDOS interfaces; link loader links  
 separately compiled segments; modules can be linked  
 with Pascal or assembler.

## LISP

**£59.95** INC. VAT

A LISP interpreter for exploring "The language of  
 artificial intelligence".

Features: Turtle graphics; compatible with LISP  
 for the BBC micro; full support of QL features; struc-  
 ture editor; prettyprinter; garbage collector and tracer.

Every DEVELOPMENT KIT includes Metacomco's  
 popular screen editor, and a detailed manual.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

POSTCODE \_\_\_\_\_

TEL. NO. \_\_\_\_\_

SIGNATURE \_\_\_\_\_

Phone today or post this coupon to:  
 Metacomco, 26 Portland Square,  
 Bristol BS2 8RZ. Please send me:

Assembler Development Kit £39.95 \_\_\_\_\_

LISP Development Kit £59.95 \_\_\_\_\_

BCPL Development Kit £59.95 \_\_\_\_\_

QL PASCAL Development Kit £89.95 \_\_\_\_\_

I enclose a cheque for £ \_\_\_\_\_ or  
 debit my ACCESS/VISA Account No. \_\_\_\_\_

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

CARD EXPIRY DATE: \_\_\_\_\_

Price includes VAT, postage and packing UK mainland only. Delivery, allow up to 28 days.

PCW8



# THE BUSINESS WORLD IS SPLIT BETWEEN THOSE WHO HAVE COMPUTER SYSTEMS- AND THOSE WHO ALSO UNDERSTAND THEM

## Introducing Byte Shop Training Centres

Pretty soon there will be only one kind of business.

The business whose staff fully understands its computer systems.

Those businesses who fail in this respect will, simply, not be in business.

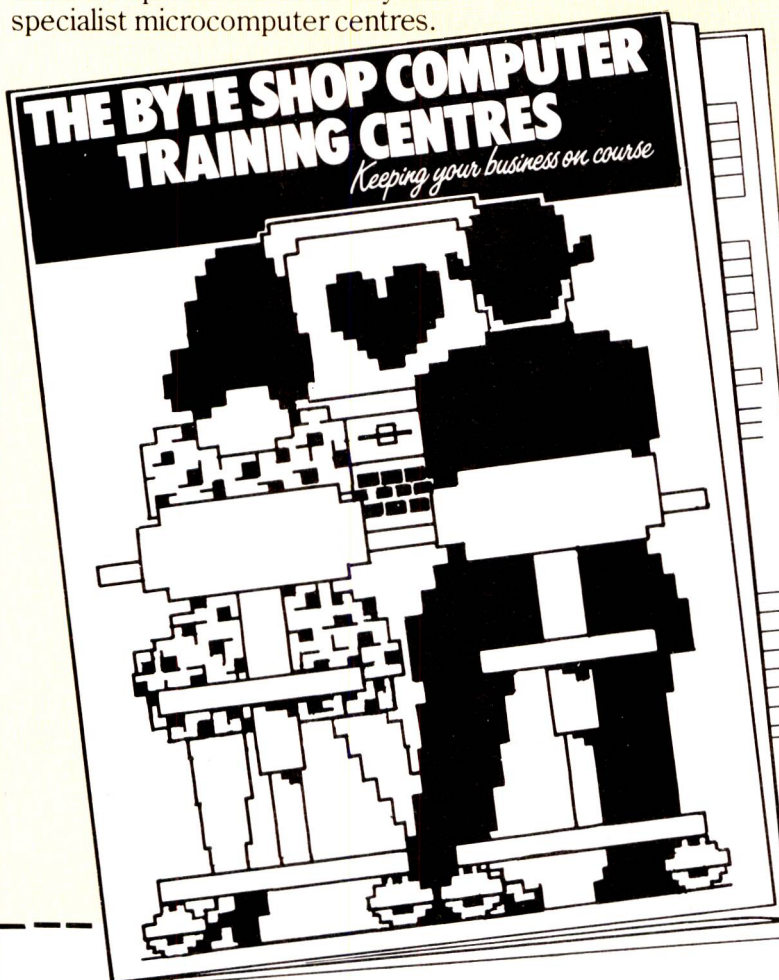
That is why—as an urgent priority—The Byte Shop is providing computer training from our Business Centres in London, Glasgow and Birmingham.\*

And they're the best—in keeping with our tradition ever since we opened the UK's very first specialist microcomputer centres.

The courses are structured and modular so students can start at the level that suits them whether they just wish to understand the basics or are DP professionals.

And since our courses are approved by the Manpower Services Commission, your company may well qualify for a grant.

Send off the coupon for our brochure containing full course details and booking forms.



TITLE	CODE	DURATION
<b>EDUCATIONAL</b> Understanding Computers — A Jargon Breakdown	ED01	1 day
An Introduction to Microcomputers for Managers	ED02	1 day
Working with Micros	ED03	1 day
Financial Modelling and Business Software — A Familiarisation Workshop	ED04	1 day
<b>WORD PROCESSING</b> An Introduction to Word processing and WORDSTAR facilities	WP01	1 day
WORDSTAR and MAILMERGE User Course	WP02	2 days
<b>DATABASE</b> Database Concepts and DBASE II facilities	DB01	1 day
Writing DBASE II Applications	DB02	2 days
Advanced use of DBASE II software	DB03	1 day
DBASE III conversion	DB04	1 day
<b>INTEGRATED SYSTEM SOFTWARE</b> Lotus 1.2.3.	IS01	1 day
Advanced LOTUS 1.2.3.	IS02	1 day
Symphony	IS03	2 days
Advanced Symphony Users Workshop	IS04	2 days
Framework	IS05	2 days
<b>PROGRAMMING</b> Thinking as a Programmer	PR01	1 day
Programming in MBASIC	PR02	3 days
Programming in PASCAL	PR03	4 days
Programming in COBOL	PR04	5 days
Programming in "C"	PR05	3 days
<b>SYSTEM HOUSE KEEPING</b> PC/MS-DOS	DOS	1 day
Concurrent CP/M	CPM	1 day
MP/M	MPM	1 day

Note:

● All products referred to are trademarks or registered trademarks of the companies of origin.

\*Courses will also be available shortly in Southampton, Nottingham and Manchester.

The Byte Shop Ltd., Grove House,  
Little Paxton, Cambs PE19 4EL  
Telephone: 0480 218812

*The* **TRAINING CENTRES**  
**BYTE SHOP**

K A Kode International plc Company

To: Ian James, Training Manager,  
The Byte Shop Ltd.,  
Grove House, Little Paxton, Cambs PE19 4EL  
Telephone: 0480 218812

Please send me a copy of your brochure containing full details of Byte Shop Training Centres.

NAME

COMPANY

POSITION

ADDRESS

TEL:

Course(s) interested in  
(state codes)





All (tick) ☐



**VITAL NEWS**  
**LONDON'S APPLE SPECIALIST**  
**HAS MOVED**  
**CALL TODAY ...**  
**BIG, NEW STORE**



If you're looking for advice on which computer system is right for your business a call to London's Apple specialist will put you right

**STIRLING MICROSYSTEMS**  
 THE BUSINESS COMPUTER STORE

**231 BAKER STREET, LONDON NW1 6XE**  
**TELEPHONE: 01-935 5262**  
 OPEN MONDAY-FRIDAY 9.30 AM-6.00PM

## SYSTEM SCIENCE

### C Compilers

DeSmet C	PC/MS-DOS	£139.00
Lattice C	PC/MS-DOS	£490.00
C86 & optimiser	PC/MS-DOS	£385.00
Microsoft C	PC/MS-DOS	£460.00
Aztec C86	PC/MS-DOS	£235.00
Aztec C II	App-DOS	£195.00
Aztec C II	CP/M-80	£195.00
C/80 Software Toolworks	CP/M-80	£50.00
C/80 Mathpak - floats and longs	CP/M-80	£30.00
BDSC	CP/M-80	£135.00
ECO-C for Z80 Code	CP/M-80	£195.00
Venix-86 full Unix for IBM PC-XT and PC-AT		<b>from £850.00</b>

### LISP Interpreters

LISP-80 Software Toolworks	CP/M-80 & MS/PC-DOS	£50.00
MuLISP/MuSTAR	CP/M & MS/PC-DOS	from £175.00
MuMath	CP/M & PC/MS-DOS	from £215.00
IQ LISP	PC-DOS	£160.00

### FORTH-83 from Laboratory Microsystems

Z80 FORTH	CP/M-80	£95.00
PC-FORTH	PC-DOS	£95.00
8086-FORTH	CP/M & MS-DOS	£95.00
PC FORTH+, 8086 FORTH+ (32 bit address)		£235.00
Floating point extensions		£89.00

### Editors

SEE Editor for IBM-PC and Apricot	£50.00
EC Editor (windows and DOS calls) PC-DOS	£125.00
PMATE IBM-PC and Apricot	£225.00
FirsTime C (with syntax checker)	£295.00
FirsTime Pascal (with syntax checker)	£245.00

Pascal Compilers, Fortran Compilers, Assemblers and cross-assemblers £ call

#### HSC 16 bit Co-Processors for Z80 CP/M systems

- choice of 8086 or 68000	- 256Kb to 1.25 Mb memory
- MS-DOS, CP/M-86 and CP/M-68K	- fit most Z80 systems
- memory available as RAM disk	- simple to install, simple to use
- 6 MHz. clock	

Prices from £675.00

Prices are exclusive of VAT and postage.  
**6-7 West Smithfield, London EC1A 9JX**      **Tel: 01-248 0962**

# RM NIMBUS

## POWERFUL. FLEXIBLE AFFORDABLE AVAILABLE

Research machines Nimbus: 16 bit super micro.

You've read the rave reviews — now try a demonstration. The new RM Nimbus can be seen and tested immediately.

Complete with full range of software, including: word processing, spread sheet, database, accounts and graphics.

- ★ The fastest 16 bit business computer
- ★ Interfacing up to 30 peripherals devices can be attached, (printers, instruments, modem, etc)
- ★ Built-in colour hi-resolution graphics
- ★ Full range of software now available
- ★ 80186 Main processor running at 8 MHz
- ★ MS word mouse driven word processor
- ★ RM graphics processor
- ★ MS multiplan spreadsheet
- ★ 8051 peripherals processor running at 11 MHz
- ★ Superfile database
- ★ 8910 sound processor running at 11 MHz
- ★ Pegasus, Sage, multipac accounts packages
- ★ MS DOS version 3.05 operating system
- ★ CAD packages
- ★ 192 K standard RAM expandable to 1 megabyte
- ★ Mouse and joystick operated painting packages
- ★ 2 × 720 K disk drives as standard
- ★ Powerful RM basic, Logo and Pascal languages
- ★ Hard disk option — 10, 20, 40 or 80 megabyte
- ★ And much, much more
- ★ Networking up to 64 stations

Telephone straightaway for an instant trial

### Regional Systems

2 Greenleaf Road, Walthamstow, London E17 6QQ  
 Telephone: 01-521 7144







# Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

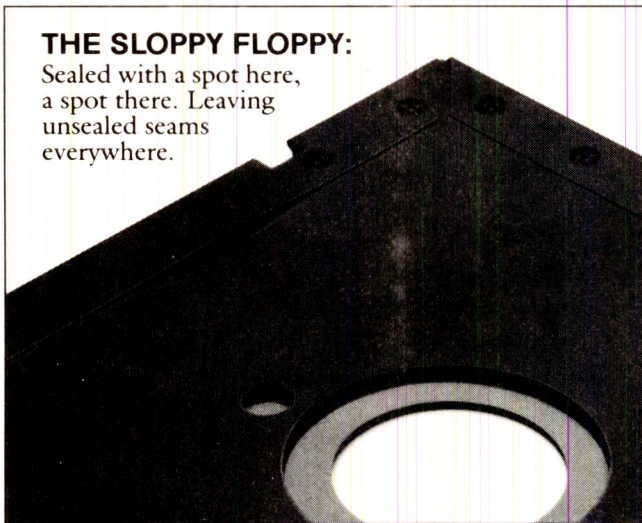
Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

So much for their seams. Ours are different.

## THE SLOPPY FLOPPY:

Sealed with a spot here, a spot there. Leaving unsealed seams everywhere.



Memorex uses a process we developed, called Solid-Seam Bonding.

Solid-Seam Bonding seals shut every inch of every seam of every Memorex® floppy disc. Tight as a drum. That makes the Memorex

floppy stiffer. Stronger. And your data safer.

To resist bulging, warping, puckering, or opening up.

## MEMOREX SOLID-SEAM BONDING:

Every inch of every seam is sealed shut. Tight as a drum.



To resist all the things that can jam your drive, ruin your drive head, or lose your data.

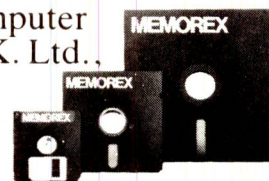
Which proves that a Memorex floppy disc isn't equal to all the others. It's better.

Solid-Seam Bonding is just one example of the extra care that goes into every Memorex floppy disc. Be it 8", 5¼" or the new 3½" Extra care that lets us guarantee every Memorex disc to be 100% error-free.

The next time you're buying a floppy disc—or a few hundred of them—just remember this:

It's always better to be safe than sloppy.

For more information on the full line of Memorex quality computer media products, including computer tape, call Memorex U.K. Ltd., 96-104 Church Street, Staines, Middlesex. Tel: 0784 51488



Your Data. When it matters, make it Memorex.™

# MEMOREX



# MODEM HOUSE

**The Single Source Solution for  
ALL Computer Communications.**

Modem House are pleased to announce the following special offers, available from your local dealer, or direct by mail.

## Micro Packs

All micro packs include all necessary items  
to turn your micro into a communicating machine.

Open the door to a whole new world.

### Spectrum (all models)

VTX 5000 modem .....	£49.95
Optional extras for use with VTX 5000	
User to User software (on cassette) .....	£3.95
Ascll format software to link to bulletin boards etc .....	£6.95

### MICRO PACKS

BBC B acoustic modem pack .....	£39.95
BBC B micropack .....	£59.95
Commodore 64 micropack .....	£99.95
Commodore Pet range .....	£99.95
Apple II range excluding IIc .....	£99.95
Apple IIc .....	£129.95
Dragon 32 & 64 .....	£59.95
Tandy Model I & III .....	£99.95
Amstrad CPC 464 acoustic modem pack .....	£89.90
Amstrad CPC 464 (including modem 1000) .....	£99.95
MSX machines including word processor and database .....	£199.95
ACT Apricot .....	£179.95
ACT Sirius .....	£179.95
Victor 9000 .....	£179.95
IBM PC & most compatibles .....	£179.95
Dec Rainbow 100 .....	£179.95

★ ★ Sinclair QL Complete Communications Pack ★ ★  
including V21/V23 Auto Answer Modem  
P.O.A.

### MODEMS

Modem 1000 .....	£49.95
Modem 2000 .....	£54.95
Acoustic modems .....	£29.95
Telemod 3 .....	£139.95
Teletext Adaptors	
TTX 2000 (Spectrum all models) .....	£129.95
<b>Optional Extras &amp; Spares</b>	
BBC (Micronet) Rom .....	£15.00
IBM PC Colour Rom .....	£57.50
IBM PC Monochrome Rom .....	£57.50
IBM PC Hercules Rom .....	£57.50
Leads .....	P.O.A.

*A complete range of multi baud rate modems are also available at prices  
ranging from just over £100 to over £2,000. We think it is the biggest  
stockholding in Europe. Just ring:*

**Modem House**  
**Computer Communication Consultants**  
Iolanthe Drive  
Exeter  
Tel: 0392 69295



# Discount Micros!

## SAVE HUNDREDS OF £££s

on the BEST RANGE OF MICROCOMPUTERS at the BEST PRICES!

RECOMMENDATION? RELIABILITY? ... 40% REPEAT BUSINESS!!!!

P  
R  
I  
N  
T  
E  
R  
S

\*

M  
O  
D  
E  
M  
S

S  
O  
F  
T  
W  
A  
R  
E

\*

P  
E  
R  
I  
P  
H  
E  
R  
A  
L  
S

### IBM PC

— Full system  
64K System Unit  
2 x 320K Drives  
Keyboard  
High Res. Monitor



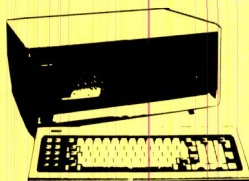
~~£2000~~

**£1598\***

### COMPAQ™

(Fully IBM compatible portable computer)

— Full System  
256K System Unit  
2 x 320K Drives  
Colour interface  
Keyboard  
High Res. Monitor



~~£2200~~

**£1698\***

### apricot

— Full system  
256K System Unit  
2 x 315K Drives  
Keyboard  
High Res. Monitor



~~£1800~~

**£1398\***

including a range  
of software FREE

### Macintosh

128K  
Keyboard  
High Res. Monitor

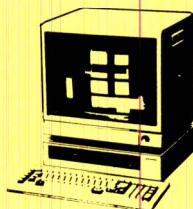


~~£1800~~

**£1398\***

### SANYO MBC 550

128K System Unit  
1 x 160K Drive  
Keyboard  
Spread Sheet  
Wordstar

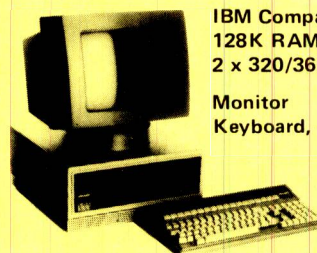


~~£800~~

**£598\***

### olivetti M24

IBM Compatible  
128K RAM  
2 x 320/360K Disc  
Drives  
Monitor  
Keyboard, etc.



~~£1939~~

**£1498\***

\* **COMMODORE PC**

\* **KAYPRO**

\* **SIRIUS**

\*

#### APRICOT

XI 256K 10MB + Mon . . . . .	<b>£2388</b>
XI 256K 5MB + Mon . . . . .	<b>£2148</b>
PC 256K, 2 x 720K + Mon. . . . .	<b>£1598</b>
PC 256K, 2 x 315K + Mon. . . . .	<b>£1398</b>
FI 256K, 1 x 720K + Mon . . . . .	<b>£1098</b>
File 128K, 1 x 315K + Mon. . . . .	<b>£998</b>

#### OLIVETTI

M24 PC + Mon . . . . .	<b>£1498</b>
M21 Portable . . . . .	<b>£1498</b>
M10 Lap held . . . . .	<b>£359</b>

#### IBM PC

128K 'XT' 10MB . . . . .	<b>£2998</b>
128K 'XT' 10MB Colour . . . . .	<b>£3298</b>
64K 'PC', 2 x 320K . . . . .	<b>£1598</b>
64K 'PC', 2 x 320K Colour . . . . .	<b>£1898</b>

#### COMPAQ

256K, 10MB . . . . .	<b>£2999</b>
256K, 2 x 320K . . . . .	<b>£1698</b>
Deskpro 2 . . . . .	<b>£2095</b>

#### APPLE

Macintosh 128K inc. Mon. . . . .	<b>£1398</b>
Macintosh 512K inc. Mon . . . . .	<b>£2199</b>
Ile 64K + Mon . . . . .	<b>£599</b>

#### SANYO

MBC 550 (128K, 1 x 160K) . . . . .	<b>£598</b>
MBC 555 (128K, 2 x 160K) . . . . .	<b>£798</b>
MBC 550 (1 x 360K) . . . . .	<b>£798</b>
MBC 555 (2 x 360K) . . . . .	<b>£1098</b>

E  
X  
P  
O  
R  
T

S  
P  
E  
C  
I  
A  
L  
I  
S  
T  
S

# 3

YEARS PEACE OF MIND PROTECTION AGAINST\*

- Breakdown, theft, etc.
- Loss of data
- Cost of hiring another machine
- Insurance in transit

\*Option available

Other machines on request.

To place your order for IMMEDIATE  
DELIVERY, call Vanessa on  
**01-938 2151** (20 lines)

\*Offer lasts for limited period only and is subject to VAT  
and change without notice!

Discount Micros Ltd.

7 Kensington High Street, London W.8.

Please send me

☐ Quote on

☐ Information on

☐ Ring me

☐ Urgent

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Phone \_\_\_\_\_ Extension \_\_\_\_\_



• THE NEW AMSTRAD CPC 664 WITH BUILT-IN DISC DRIVE

The advertisement features a central image of the Amstrad CPC 664 computer system. The monitor displays a spreadsheet with a bar chart. The keyboard is white with blue function keys. The floppy disk drive is black with 'FDD' printed on it. A 5.25-inch floppy disk is shown in the bottom right corner.

• THE NEW AMSTRAD CPC 664 •

• AVAILABLE AT BOOTS • COMET • CURRYS • DIXONS • GREENS • JOHN MENZIES • RUMBELOWS



# THE LOW COST COMPUTER FOR HOME AND BUSINESS •

If you know anything about computers you'll know that disc drives are up to fifty times faster than cassette when you're loading and saving programs. In fact, a disc drive makes computing faster, more reliable, more efficient and more fun. But up till now the only way to gain these advantages for a home computer was to buy a separate disc drive attachment. Now Amstrad are pleased to announce the first complete home computer with built-in disc drive: The Amstrad CPC 664.

And when you buy a CPC 664 you'll find it's not just the disc drive that's built-in.

You'll get everything you need, including a monitor (green screen or full colour). We'll even give you a free CPM and Logo disc, so all you do is plug in and you're in business.

## BUSINESS OR • PLEASURE •

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

There are accounting, word-processing, spread-sheet and data-base programs (to name but a few).

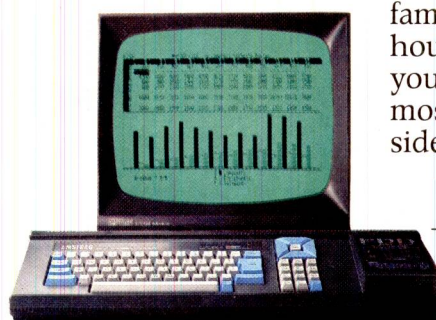
Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).

business more efficient and effective by providing access to the famous range of CP/M\* software.



WITH COLOUR MONITOR AROUND

• £449 •



WITH GREEN SCREEN AROUND

• £339 •

# THE HOME COMPUTER THAT MEANS BUSINESS.

## HIGH PERFORMANCE

### • LOW COST •

The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.

You only have to check the cost of buying all the elements separately (64K computer, disc-drive, monitor) to realise that the Amstrad package is very hard to beat.

With a green screen monitor the cost is just £339. With a full colour screen it costs £449. And after you've saved money on the price of the computer itself, you go on saving on the price of software.

There are hundreds of programs for business or pleasure available on disc (and cassette) to CPC 664 users. Many from Amsoft, others from other

famous-name software houses. Few will cost you more than £49 and most will cost you considerably less.

## AN EXPANDING • SYSTEM •

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

## • AMSTRAD USER CLUB •

Join the optional Amstrad User Club and we'll keep you informed with our monthly user magazine, and information on all software as it is introduced. Your membership details

will be recorded on your personal club card, which entitles members to various privileges and offers.

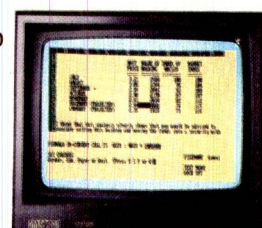
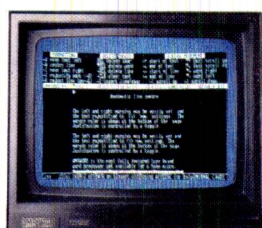
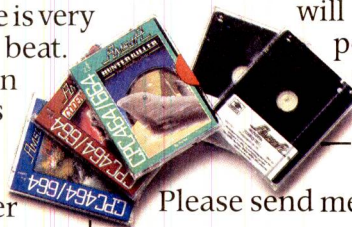


Figure analysis made easy with Microspread. An easy to use spreadsheet with pull-down menus and a wide range of mathematical options. Around £49.



Wordprocessing with Amword can improve the productivity of everyone from unskilled typist to trained secretary. Around £23.95.



Please send me more information

Name \_\_\_\_\_

Address \_\_\_\_\_

## Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EF

PCW/664/1

\*CP/M is a trademark of Digital Research Inc.



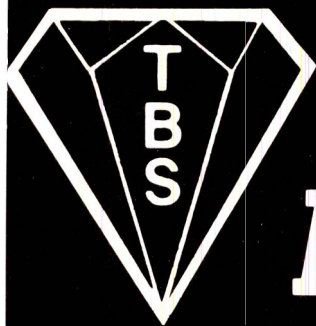
# LOOKING FOR SOFTWARE?

- \* We hold a library of information on Software & Hardware.
- \* This library contains detailed information on business software for micros and minis.
- \* You can use it as a single impartial source of information to assist you finding the correct equipment.
- \* Our computer will list all the options that fit your requirements so you can be satisfied you have made the right choice.
- \* Once we have found what you're looking for we can then put you in contact with a supplier who is qualified to show you the software & hardware working.
- \* We can also assist you in finding peripherals, communications equipment, leasing, maintenance, training, and computer office furniture.
- \* OUR SERVICE IS FREE AND IS DESIGNED TO SAVE YOU TIME AND ENERGY IN UNNECESSARY RESEARCH.
- \* Phone this number and we will help you find the software & hardware you need.

**SOFTWARE  
INFORMATION  
LIMITED**

**01-831-0071  
(Five lines)**



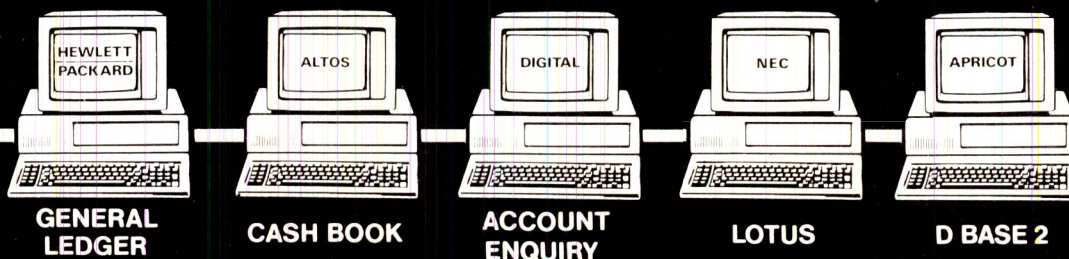
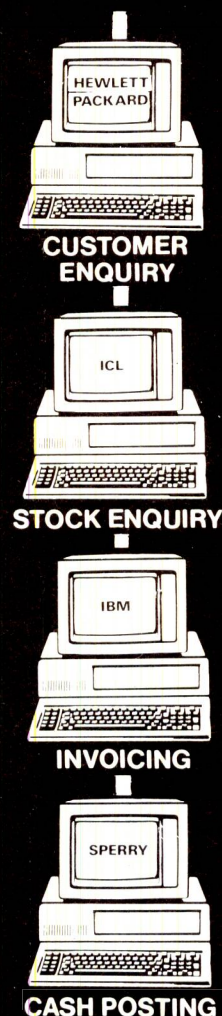
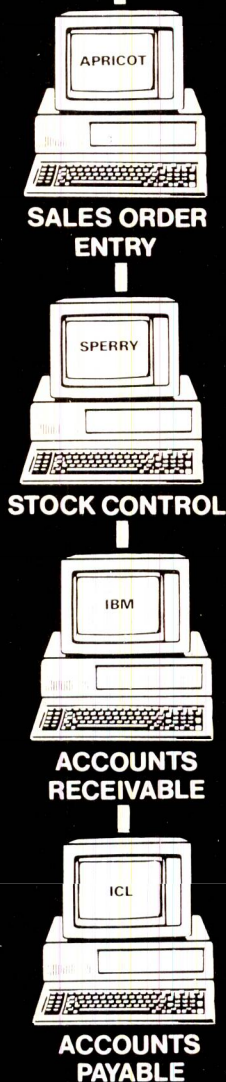


# Integrity Multi-User Accounting Software

The most powerful currently available

## FEATURES

1. Modules can stand alone or integrate with each other.
2. Integrates with Lotus 123, D Base 2, Superwriter, Wordstar, Supercalc, D Base 3.
3. Separate companies accounts on same disk. Ideal for accountants with many clients and companies with subsidiaries.
4. Nine levels of password control for total data security.
5. Caters for 4 levels of operator experience.
6. Runs FAST on APRICOT POINT 7, APRICOT POINT 32, SPERRY NET, IBM NETWORK, ICL MODEL 36, HEWLETT PACKARD, ALTOS, DIGITAL, NEC etc.



★ ICL, ACT & SPERRY APPROVED PRODUCT ★

Dealer Pack & Demo Available On Request

Sole UK  
Distributors  
for Integrity  
Software



## Tailored Business Systems Ltd

2nd Floor, Gate House, The High, Harlow, Essex CM20 10U

CONTACT US ON... **0279 413893** (10 lines)



# LUTTERWORTH SOFTWARE

## THE NUTCRACKER SUITE

Why use a sledgehammer to crack a nut? Most word-processors are too powerful, too complex and too expensive. The Nutcracker Suite's three programs are really easy to use. You can even print text as you enter it. Has word-wrap and paragraph reforming, plus line and page editing functions using every key in the most natural way. Reads and unscrambles Wordstar files. Saves and prints in 100% ASCII format. Special printer control program also included.

Winner C.T.A. Award Best Business Program 1984

## THE ULTIMATE DIARY

Event based diary for every professional. Events can be entered with a frequency tag (e.g. every two weeks, every three months, annually, even every second Tuesday!), and will re-appear in all future reports. Reports for today's events, this week's events, this month's events. Calendar for any month up to 2083. Simple search routine (any field) with wild cards. Up to 5000 separate entries, which can easily be amended or deleted.

## MICROFILE

Powerful flat form database. User can set field lengths and labels for any number of separate databases. Up to 16 fields and 32,767 records. Search or sort on any field. Print format options, allowing mail-merge, on both automatic and inspection basis. Superbly easy to use with all prompts on screen.

**EACH PROGRAM IS ONLY £43 + VAT (£49.45)**

FORMATS: IBM PC DOS/APRICOT MS DOS

Ask your dealer for a demo, or send cheque to:

LUTTERWORTH SOFTWARE,

126 NEW WALK, LEICESTER LE1 7JA (Tel. 0533 550822)



## LOOK SPECTRUM OWNERS

### L.M.T. 68FXI KEYBOARD

Featuring **A full size space bar** with dedicated numeric and cursor keypad. The LMT 68FXI increases the number of keys from **40 to 65**. The full-travel sculptured keys with **high quality printed characters** ensures ease of use. To fit your **Spectrum** computer board into the LMT 68FXI is **simplicity itself**. Full fitting instructions are included with every LMT 68FXI.

**ONLY £39.95** (INC VAT & CARRIAGE)

LMT COMPUTERS, UNIT 2,  
274 BAKER ST., ENFIELD, MIDDX.  
EN1 3LS. Tel: 01-367 0035

**COMING SOON** combined disk and printer interface for Spectrum only **£79.95 inc VAT**.

# The complete computer store...

Word Processing ■ Communications ■ Data Management ■ Business systems

*Consultancy*

*Installation*

*Training*

*Support*

Business and  
Professional Systems  
(0223) 65334/5

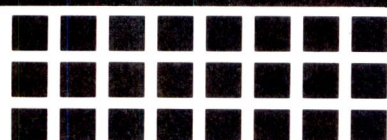
Engineering  
Support Group  
(0223) 316045

Home and  
Educational Computing  
(0223) 358264

Communications,  
Electronics, Supplies  
(0223) 68155



Sinclair Tandy EPSON KAYPRO SANYO



**Cambridge Computer Store**

1 & 4 Emmanuel Street, Cambridge CB1 1NE



# TBS Distribution Limited

Paying £250 for a single module?

**Our Super £250**

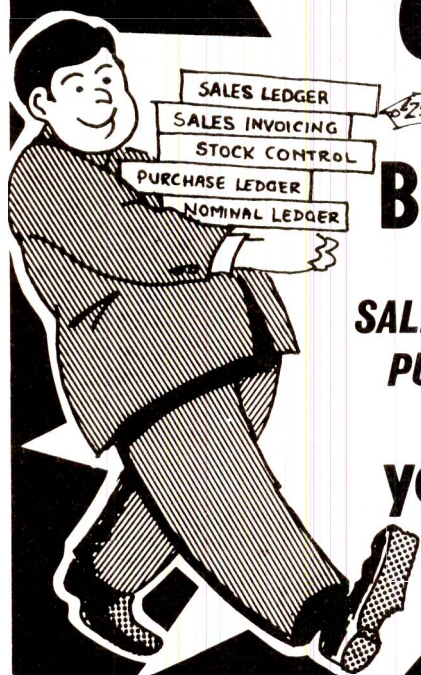
## Total Integrated Business Accounts Package

includes

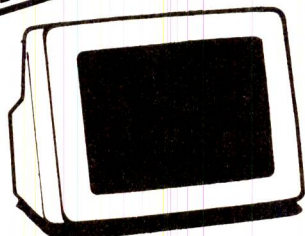
*SALES LEDGER, SALES INVOICING, STOCK CONTROL, PURCHASE LEDGER and NOMINAL LEDGER plus all manuals and documentation*

**yes all for an unbeatable £250 + VAT**

Runs on all APRICOT, IBM, SPERRY, SANYO & SIRIUS MACHINES  
(Payroll available at extra cost)



**Also**



HIGH RESOLUTION

## 12" Monochrome MONITORS

FOR APRICOT, SPERRY, IBM or IBM COMPATIBLES AND  
MOST BUSINESS & HOME  
COMPUTERS

**From £159 + VAT**

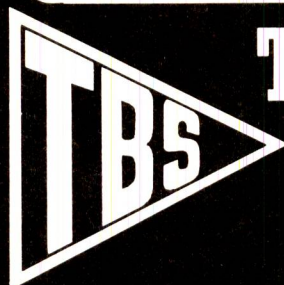
**Plus**

# brother

**M-1009 Centronics Compact  
Dot Matrix**

**£169 + VAT**

## PRINTERS FOR MOST BUSINESS & HOME COMPUTERS



## TBS Distribution Limited

2nd Floor, Gate House, The High, Harlow, Essex CM20 1OU

**Tel. (0279) 22323**





*The Einstein steps out of the shadows as Guy Kewney tracks down this month's hot news. CD ROMs are nearly here and plans are a-foot for this years PCW show.*

## Brains before beauty

The important part of last month's announcement about the new Amstrad was the missing bit — the fact that a much nicer Amstrad is still waiting in the wings and will actually be fully CP/M-compatible.

But until then, the Tatung Einstein, one of last year's forgotten launches, has a chance — and with the assistance of Dixons, it is going for it in a big way.

The difference between the Einstein and the Amstrad family is that they have different crippling limitations as CP/M machines. Neither is guaranteed to run CP/M applications straight from the CP/M user group — the Amstrad because of memory problems, the Einstein

because of screen problems.

The Amstrad family is short on memory. CP/M distributors have flatly refused to support the machine, on the fairly obvious grounds that there isn't anything in it for them. As one put it: 'We might sell a few copies of SuperCalc One — big deal! WordStar won't run, so what's the point?'

That's exaggerating, but not by much (and Amstrad does have an implementation of WordStar running).

The Tatung machine, however, was handicapped by a similar bodge-up — a 40-column screen. Try running any CP/M software on that, and see what sense you can make of what you see . . . and, it turns out, a cumbersome screen display system adds to the problem.

No-one is saying how long we have to wait for the 64k TPA (transient program area) version of the Amstrad. But in the meantime, the Einstein has repaired its missing limb by releasing a module to give it 80-column display, and has cut its price to give the Amstrad a run. For around

£500, the Einstein now comes with a high-resolution monitor (good enough for 80 columns in colour, which I warmly suggest you don't try on a colour Amstrad) and two disks, and is supported by Xitan, the CP/M specialist distributors of Southampton.

Geoff Lynch is quite excited by the amount of interest, if a little miffed at the timing. 'We'd run down the CP/M market quite gently,' he grumbled happily, 'and suddenly we're having phone calls from all these Dixons branch managers, wanting software for the Einstein.'

Dixons bought 10,000 Einsteins inside two months, and if they sell, will buy more.

At the price, you can't really fault the machine unless you want to do one thing. That thing is: communications.

It will, my sources tell me, run the universal communications program, Bstam, which is widely used by programmers for getting software from one machine directly into another when they can't read each other's disks. With a little care, Bstam can even be used to drive a modem, but not easily, nor by a beginner (nor by me!).

But Bstam is a line-buffered program. Most terminal programs like to display each key on the screen as you type it; Bstam waits until there is a whole line, and then puts it up.

Each character on the Einstein takes five milliseconds to display, with the internal software grinding away furiously. That makes it impossible to use the machine as a terminal, even at 300 baud duplex — there isn't time to get the characters onto the screen at that speed.

A solution, apparently, is on the way. Despite several attempts to contact Tatung staff in the week before going to press, I couldn't get any 'horse's mouth' information on when, or how, or whether previous users will be able to buy it.

In the meantime, anyone wanting the Einstein should contact their nearest Dixons store for details.

when, at the end of a really hard bit of program writing, the lights go out, can be avoided. Use the auto-save feature given to a BBC Micro by Software Services' new ROM, and it will make a copy to disk every four minutes.

This is one of 14 new commands provided by the ROM, including a very suspicious feature called \*CLONE which makes a complete copy of any (40-track) disk in four minutes.

The one I like, however, is \*CONVERT, which turns a 40-track disk into an 80-track disk with 40 spare tracks.

Full details of the £30 chip on (051) 427 7894.

## Sharp chips

Sharp makes chips as well as micros — chips rather more successfully than micros, actually. And its latest release is really rather exciting in its small way — it gives Z80 systems a way of working on multiple tasks.

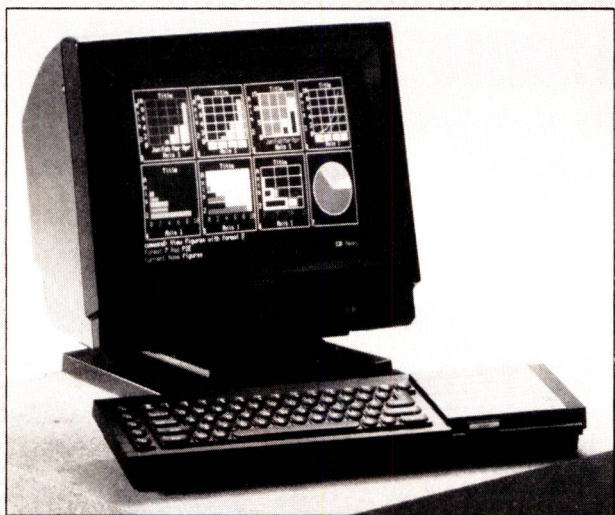
The component is the LH 8575, and it is a 'multi-tasking support processor', or MTSP. It will control multiple tasks on a priority basis, up to a maximum of 255.

Altek Microcomponents, the distribution company which drew the product to my attention, points out that the device works in response to commands issued from the main processor chip, the Z80 (Sharp builds a version of that chip) 'so it can work with a variety of different bus structures and popular processor types', says Bob Green at Altek.

The processor operates 'in a manner similar to a conventional real-time operating system, and forms task management routines such as creation, deletion, and so on, independently of the primary processor. User programs are selected on a priority or time-slice basis'.

There is some way to go before an add-in circuit like this gives us a multi-tasking Spectrum, however.

The system selects user programs and switches between them by an interrupt generated by the MTSP (but the way most Spectrum games are hacked, you can bet that some genius has already used that interrupt for



**The main difference between this Microvitec 'business user' Cub for the QL and the normal 'domestic user' Cub for the QL, is that this one is more expensive but you get a swivel and tilt stand.**

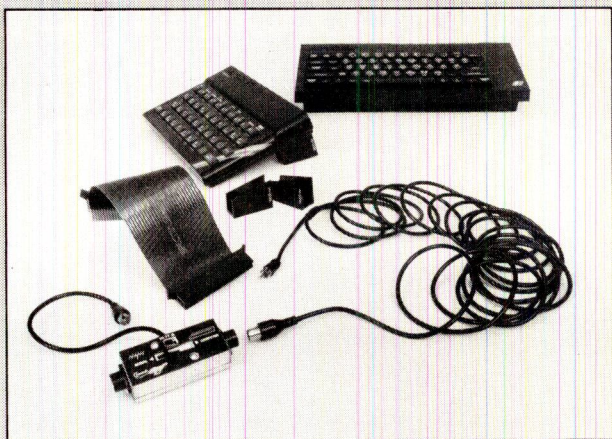
**Just for once, I'll resist the temptation to suggest that people who want a 'deluxe' screen might seriously consider buying a deluxe micro to go with it, because QL business users seem to be a loyal lot.**

**The Independent QL User Group has had to withdraw (under gentle pressure from Sinclair Research) its call to members to take the company to court for providing a system 'not suitable for ordinary business use'. The reason was simple — hardly anyone agreed. Those who did, one presumes, bought another micro.**

## Multi-tracking

That sinking feeling you get





**Best value for money in this collection of odd add-ons for the Spectrum is the silver box at bottom left — a two-way aerial adaptor. You plug the TV and the micro into that, and then switch between software and Dallas without reaching behind the TV each time. At £2.25 it beats the 15ft aerial extension lead at £1.50, or the Hi-Stak feet at £2.99 for two, though should you buy the feet to tilt your Spectrum (they also work with the Vic-20, ZX81, and so on) you will probably want that flat cable, the extender for the rear port — it stops your add-ons from hanging loosely in the air. Details, if you can't get them from stores, from Cheetah on (01) 833 4909.**

something quite different), and instead of switching between word processor and communications, your interrupt is likely to fill the screen with the dreaded 'Game Over' message.

But at least the possibility now exists of doing a multi-tasking Spectrum, cheaply.

Details from Bob Green on (0734) 791579.

## Spectrum life-saver

One step better than the 'Romantic Robot' for transferring programs from tape to Spectrum Microdrive is the Mirage Microdriver from Mirage Microcomputers.

The Romantic Robot was foolproof in untangling programs that wanted to live on audio cassette, but some program writers, more concerned with security than sales, actually prevented it from working by building timing routines into the load process. Loading from Microdrive would be too quick, and the program wouldn't load. This was supposed to be clever.

The Mirage Microdriver is a bit of hardware, not just a program like Romantic Robot. It costs £40, and is available by mail order only from Mirage at 24 Bank Street, Braintree, Essex CM7 7UL. In the interest of clarity, I must point out that this product hasn't been tested, nor do I have any personal evidence that the company exists other

than the announcement, so you order entirely at your own risk.

However, assuming that the product is available, it works rather like the Quickshot on the Apple II by taking a photograph (so to speak) of what is in the memory of the computer and saving it to Microdrive, as follows.

'The user loads and runs programs in the usual way, with the Microdriver attached to the Interface 1 expansion port. At any time, the button on the Microdriver can be pressed, and program operation is halted.'

At this point, the Microdriver stores the contents of the Z80 processor registers and selected areas of memory in its internal 2k of RAM, and two lines of text appear at the top of the Spectrum display. These are used to print a menu, and there are other prompts to guide the user through saving and loading.

The drawback (from a pirate's point of view!) is that the version of the software now stored on Microdrive will only run with the Microdriver itself. When the program is run, it will restart exactly from the point reached when the button was pressed.

This gives a whole new feature which Mirage doesn't go into — game 'save' ability.

A game which has been taken through the third level after 10 minutes work is often only just getting interesting. At that point, inevitably, the phone rings, and you have to watch in agony as your

remaining three lives, so carefully conserved through the aeons of painstaking play in the boring initial stages, are squandered by a little man on the screen who lets the snakes eat him, the dwarf hit him on the head with the sausages, the pit open up under his feet, or granny run off with the bottle of milk.

Fear not! — the Microdriver will save the game at this point, and let you restart it, from this point.

You can also modify the program, as there is an option in the Microdriver menu to return to Basic and use the POKE command to change critical memory locations — giving infinite lives, for example. Again, the saved program will only work if run with the Microdriver.

Phone (0376) 48321 for details.

## PC Prestel

There are many ways of using an IBM PC to watch Prestel, and most of them involve hard work. Almost without exception, you are required to plug a chip into the main board to provide the Prestel characters.

The exception is Datasoft's communications package, which costs a generous £315 including modem, and does all screen-handling purely with software. The modem is a Thorne-EMIO DataTech VX543/10, but a version of the program is also available to drive 'any suitable modem',

says the company.

It's quite a comprehensive list of features which Datasoft has sent me with its announcement, and I look forward to testing it — but, just picked out from the list, I note that there is a window-driven option, a full-screen videotext editor, a file encryption option, and voice-call support.

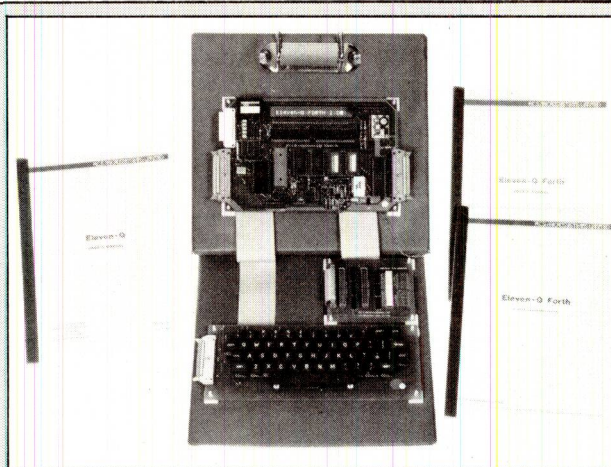
Details from Datasoft on (04605) 4809.

## Charting success

'Obviously', says JVC (UK) Limited, as though only a fool could fail to see it — 'obviously all the rather dubious press the MSX computer format has received over the past few months has been slightly off the beam.'

The fact that makes this obvious is the appearance of what JVC rather endearingly calls 'three software titles' (slippers? a fur muff?) in the computer 'software top 50'.

It's very kind of JVC to draw our attention to the appearance of Zaxxon, Buck Rogers, and the The Hobbit in MSX format in the top 50 — but most people, I'm afraid, will fail to agree that 'MSX as a format is gaining considerable support from the computer-buying public'. One might note that the most outrageously successful program ever for the BBC Micro, Elite, never made it to the top of the chart because



**One look at these bare boards, with one-line, 20-character displays described as 'human interface', and you know two things: firstly, it's 'educational'; and secondly, it's expensive. This is a tutorial course in the Forth language, called Eleven-Q, and the advantage is that you can stick in your soldering iron without worrying about your warranty.**

**Cost is around £300 for a system with 'space for RAM and ROM', but a full price list is available from RCS Microsystems at The Kings Arms (no, it's been deconsecrated, and is just an office now), 141 Uxbridge Road, Hampton Hill, Middlesex TW12 1BL. The price list could do with a little editing — it shows a system with keyboard as being cheaper than one without. Phone (01) 979 2204 for clarification.**



# Instead of computers cat technology now has to ca



The way we see it, technology has suddenly got quite a race on its hands.

There's no other home computer in the world that's so expandable or so updatable as the new Enterprise 64.

And if you're wondering quite how we've managed that, kindly take a closer look at the outputs on our remarkable new machine.

You'll notice that amongst all the usual sockets and terminals, we've gone and incorporated a special 66-way expansion port.

This will accept a whole range of new peripherals that are in the pipeline. Including those that are a mere twinkle in the eyes of our hardware designers.

We thought this expandability principle was such a good idea, we applied it to the Enterprise's memory, too.

Even in its most basic 64K form, this puts more user RAM at your disposal than almost any other competitor.

But plug in our special Rampacks to the base unit, and you can progressively increase that figure to a truly extraordinary 3,900K.



# ning up with technology, ch up with a computer.



Not that that's the only challenge we present to today's ambitious programmers.

With a screen resolution of up to 672 x 512 pixels, 256 colours and a high speed video processor, the Enterprise will outgun all but the highest quality TV monitors.

And the sophisticated sound chip generates no fewer than 4 voices across 8 octaves in full stereo.

Combine the two and you can create effects that leave today's games looking like pub video tennis of the mid-seventies.

For anyone with literary aspirations, the Enterprise also comes complete with an integrated word processor.

Whilst the really serious user will be delighted to

discover analogue RGB and TV outputs, as well as parallel, RS423 serial and network ports.

Both Cobol and 'C' will be available with CP/M running, and you can even use Lisp, Forth and Z80 assembly language on cartridge without encroaching on user RAM.

The new Enterprise 64.

It hasn't just overtaken technology. It's left every other home computer straggling in the distance.

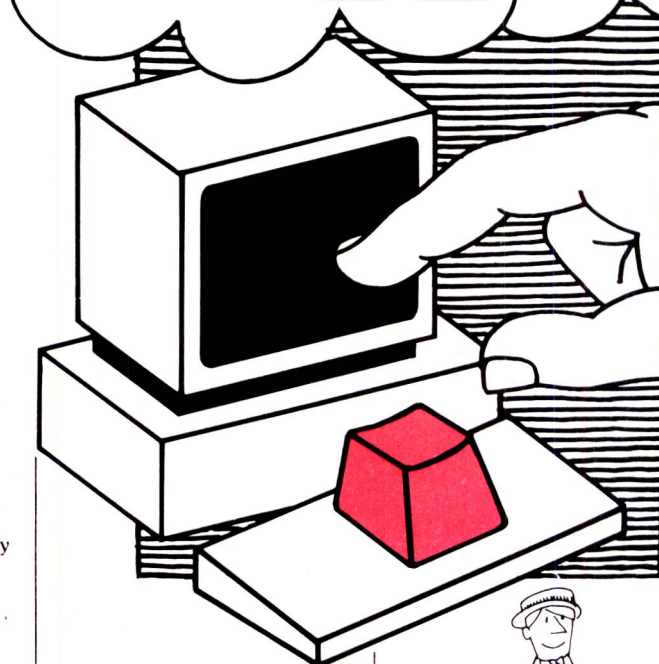
**ENTERPRISE**  
**C O M P U T E R S**

WITH OBSOLESCENCE BUILT-OUT



# The Electronic Assistant is here today . . .

# SMART KEY



**SmartKey** is an electronic assistant in the form of a computer program available for today's standard business microcomputers.

He works at the speed of light, will pander to your every whim and has the power to dramatically improve the way your personal computer works for you.



## Customise your keyboard

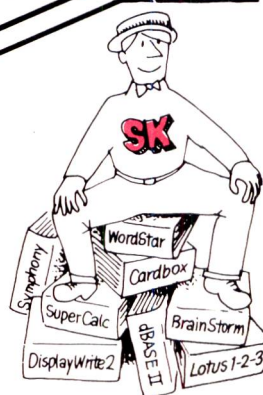
He can intercept and modify your keystrokes, reconfigure your whole keyboard to suit each application, and make your foreign characters, graphics characters and mathematical symbols just ONE stroke away.

## Automate your keyboard

And **SmartKey** does so much more. You can ask your assistant to assign several thousand characters to a single key. He will type standard phrases, paragraphs and even pages while you just press ONE key.

## Customise your software

**SmartKey** understands all the complex sets of commands and control sequences you use to drive your software. Your electronic genius will provide you with hundreds of function keys so



you can simplify, standardise and control your programs. Load a file, select a report, modify and print it . . . by pressing ONE key.

## Automate your software

**SmartKey** can automate most of your tedious, time-consuming and repetitive keyboard work. You'll never need to type the same old lengthy command sequences again. Instruct your assistant once. From then on, the work will be done automatically when you press ONE key.

## Sleep soundly

**SmartKey** doesn't mind how long it takes either. Your assistant will continue working for you long after you've gone home to bed – just as long as you've remembered to press ONE key.



## He could be working for you tomorrow . . . order now!

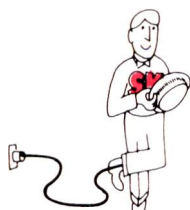
Available under DOS 2.0 (or later) for the IBM PC, XT, AT  
and all true compatibles. Price **£99** + £3 P&P+VAT

Direct from Caxton Software Ltd, 10-14 Bedford Street, London WC2 9HE

Telephone 01-379 6502 Telex 27950 ref 398

Send or telephone today – Access or Visa welcomed

Ask about our volume purchase terms



**Caxton**





**You may think this picture of Info 85, an exhibition which attracted 20,000 visitors over three days, proves no more than the inefficiency of the ticketing arrangements. However, my sources report that it was indeed a successful exhibition, where Commodore's new IBM clone made one of its first public appearances in the UK.**

**The new Commodore is not being launched as a colour system, but will take many colour boards available for the IBM PC, and its near 30 per cent discount on the original has attracted more interest than I'd guessed.**

**Five big-name hardware distributors have undertaken to supply this machine to the thousands of dealers around the country who are not entitled to sell the IBM because IBM would never consider appointing them as dealers. These distributors are Pete and Pam, Northamber, Norbain, STC Electronic Services and Westwood Distributors. Pete and Pam, together with Software Ltd, have special software departments to handle this machine, too.**

**The result is that, although the Zenith PC is now seen as one of the major alternatives in the States, Commodore's distributor agreement in the UK may have given it an edge, a view which puts me slightly at odds with the Benchtest in the May issue.**

**I agree that now, four years after the launch of the IBM PC, is a strange time to arrive with a clone, but the software market is there, and the AT isn't yet available in volume. And the PC II isn't even announced as I write this. So make hay, Commodore, while there is sunshine.**

**Back to Info 85: the details of next year's show are: 25-27 March 1986, at Olympia's National Hall. Anyone requiring further details should contact BED Exhibitions on (01) 647 1001.**

the BBC is, by comparison with the Commodore 64 and Spectrum, very much a minority machine.

And by comparison with even the BBC, the MSX format is not even an also-ran, and anyone who knows no more about the industry than how to spell 'software' correctly, is fully aware of this.

## Patching the problems

Just about everyone who has ever used WordStar will know the frustration of having a nice dot-matrix printer capable of the highest-quality print, tiny superscripts and subscripts, and genuine underlining — but having instead to use WordStar's clumsy double-type for

boldface, or single underline characters . . . you will all be fascinated to hear of WordPatch.

The program tackles the simple problem that WordStar doesn't give you enough space inside it. WordStar assumes (quite wrongly) that you can switch a printer to superscripts with a control sequence of four ASCII codes. Most printers take more. Worse, WordStar assumes that the sequence of subscripts is the reverse of the superscripts — it tries to roll the platen up or down to print above or below the line. Your matrix printer has totally unrelated control codes, and all hell breaks loose if you try to fit the instructions from your printer manual into the WordStar Install program.

This has been known to MicroPro since the first Epson

came out. The response of MicroPro — nothing.

WordPatch makes three changes to WordStar: it expands the printer instruction area; it writes the appropriate instructions into the new, enlarged print area, for your printer; and it also changes the menu, so that when you type control-P (the sequence which prepares WordStar to send a printer control sequence) a menu appears, showing what the new control characters actually are. (On my versions of WordStar, the menu tells you to set a certain code to use the other ribbon colour. I use it for underlining.

The American company which produces this is CMB3 Technologies, and it is looking for dealers; telephone (415) 930 0470. It expects the product to retail at \$50.

## By any other name

You may feel entitled to be puzzled by the simultaneous announcement by First Software of Basingstoke of add-on boards for the PC/AT, and the announcement by First Software of First publishing, of a set of business software packages for the Commodore 64.

The first First Software was, of course, the American company. That has set up in this country in association with John Weatherhead's Reflex software distribution business, and is distributing Tecmar add-ons for IBM machines. The Maestro multi-function board is its launch.

However, the title First Software was actually being used around September last

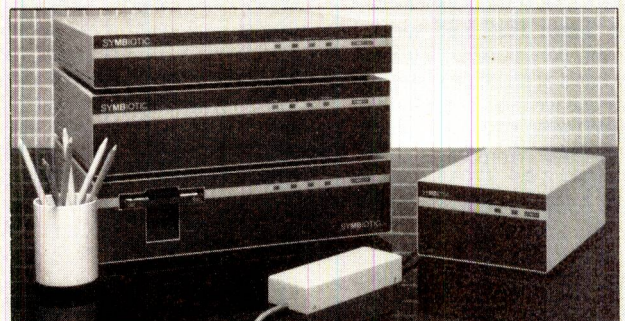
year by Sara Galbraith, ex-Peachtree, who (as far as I can determine) registered the company name around two weeks before Weatherhead's lot did.

Sara Galbraith has worked on the assumption (very reasonably) that people who use IBM PCs at work can't afford to buy another for home use (and we all know how portable they are). She's trying to produce software which fulfills similar functions, so that executives with a 64 at home can get some useful work done.

Galbraith's First Software is part of her new company, First Publishing, which does books for the 64, too. Her software starts off with an assembler/monitor for £19.99, a word processor at £35.99, and includes a database manager, Pascal, and a Basic compiler. The books include *Anatomy of the 1541 disk drive* which 'unravels the mysteries of using the misunderstood disk drive,' which makes it sound as though the horrible little box has made at least one friend.

The squabble over the name will no doubt proceed until it is resolved, and I'll let you know as soon as it is. And when Galbraith lets me have a phone number, I'll give you that, too. Meanwhile, contact her through the energetic Peter Jones, her publicist, on (01) 580 8418. He's a sweetie, but a trifle inclined to take his job single-mindedly ('In answer to your question, I've contacted them, and they do have it in stock. What price? I'll have to ask. I'll call you back'), so make sure you know what you want in detail before you call.

Weatherhead's outfit,



**The 'half-price Apple II for education' scheme has been widened to include the Macintosh, which is going out at a 30 per cent discount — not greatly to anyone's surprise. However, what is surprising is the announcement by Symbiotic, which does hard disks and local nets on Apple hardware, that it is joining in. It is offering a 50 per cent reduction on its Symbnet which normally costs £4000 including a 10 Mbyte disk, and now starts at £2000.**



# MORSE: THE TOP TEN SYSTEMS



Value



Advice



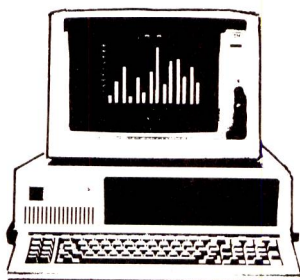
Software



Printers



Support



1

**IBM Personal Computer.** The World's best selling Personal Computer, as well as ours. Although a recent increase by IBM has pushed our price slightly higher, we can still offer the PC with twin 360K disks, monochrome display, UK keyboard, printer adaptor and DOS 2.1 with full 12 month warranty, and bundle 6 utility programs, simple spreadsheet, text editor and 10 others. **SAVE £560 ON IBM PC's NORMAL PRICE! £1600**

2

**IBM COLOUR PC.** Like the above system this IBM PC has two 360K IBM disk drives, keyboard, DOS 2.1, Basic and full 12 month warranty, but we've exchanged the IBM monochrome display for the colour display and graphics adaptor. Morse also supply a selection of free programs including utilities, spreadsheet & word-processor. Printer adaptor £87, extra memory, £70 each 64K. **This system normally over £2480! £1900**

3

**IBM XT.** The 10Mb Winchester version of the PC is still as popular as ever, and we suspect the shortage of AT's is the reason. Our 128K RAM, monochrome system with communication port is ideal for planning, database or accounts applications. **SAVE OVER £410! IBM XT now: £3190**

7

**APRICOT Xi.** Superfast and super powerful 10Mb version of the Apricot. Full hard disk computing at even lower prices. Morse have cut the price by £300, and are giving away the NEC nlq printer & cable worth £380. Bundled with Superwriter etc. **SAVE £680! £2690**

4

**COMPAQ DESKPRO.** This superfast machine almost matches the IBM AT's performance, and 30Mb disk option is in stock **NOW!** With 640K, 10Mb disk, tape backup, we supply with **FRAMEWORK or SYMPHONY, NEC NLQ printer, disks, cable at NO EXTRA COST, SAVING £970! £5595**

8

**APRICOT PC.** Compact, powerful, friendly, British. This hugely popular system now has Lotus 1-2-3, Symphony and many other programs available. **SAVE £300!** High demand has allowed us to prune the prices to £1690 for twin 720K disks, and now on twin 315K disks: **£1490**

5

**COMPAQ PLUS.** Compaq Portable + 10Mb Winchester = strength + value. This 256K computer has a reputation for being really tough and reliable. Morse stock this popular machine at nearly **10% below the list price**, so you can store more and pay less. **SAVE £355! Only: £3590**

9

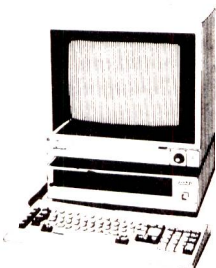
**APRICOT PORTABLE.** The computer you can talk to! Remarkable piece of technology with flat liquid crystal display and speech recognition. 256K as standard, 720K disk drive, loads of software, all in a 12lb. pack. Morse can supply it from stock. **With FREE £95 MOUSE! £1695**

6

**COMPAQ PORTABLE,** the No.2 PC in the U.S., and the best of all compatibles. With 256K, unique graphics and text display, dual 360K disk drives and of course, portability, the Compaq is great value. Now it's even better value because you **save £200** **£1990** at Morse. Why pay any more?

10

**APRICOT F1.** Incredible value full specification business micro. Bright colour display, 256K memory, 720K disk drive, infra-red cordless keyboard. Bundled with word-processor and spreadsheet. In stock now. **Mono display £200, Mouse £95 £995**



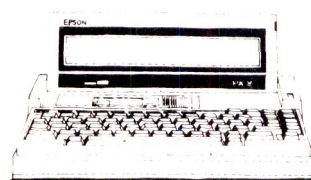
## SANYO SUPERDEALS!

The Sanyo MBC 555 series has proved very popular. It's ideal as the basis of an office system. Now Morse have even better prices! **SANYO MBC 550**, 160K disk drive, 128K RAM, WordStar & CalcStar, MSDOS, (RRP £795), now **£600** **MBC 555**, 2 x 160K drives, 128K, Word-, Spell-, Info- & CalcStar, Mailmerge etc. (RRP £995), **£795** **MBC 555 (x2)**, as above, with twin 360K disk drives (£1395) **£995** **CRT 36** green monitor: **£127** **CRT 70** colour monitor: **£495**



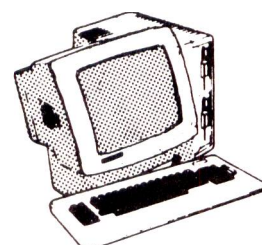
## MORSE HARDWARE

**Digital Equipment** make some of the finest wordprocessors, and the dedicated **DEC MATE II** can be found in many offices. Morse offer the DecMate II (list price £3049) at **£1790, saving over £1200!** **NEW PRODUCTS AT MORSE.** By now we should have the new grey Apricot Xi's, with 512K and 20Mb hard disks. The HP7475 6-pen plotter is just in. Use with 1-2-3 or Chart. Coming soon: Tapestry, IBM's network. You can link up with **£1600 IBM PC's** at Morse.



## EPSON AT MORSE

Selling like hot cakes, the 64K **EPSON PX8**. Lap-held CP/M, with 80 column LC display, WordStar, CardBox, Calc, diary etc only **£795** **NOW IN STOCK:** PF10 battery operated 360K disk drive, **£395**. **JX80** seven colour printer, **£560**. **CASIO FP200** portable computer. Basic, CETL etc, (list £299). With **FREE** £35 database and other software, at Morse only **£230**. **CASIO PB700** pocket computer with Basic & graphics (£110) **£86**. Plotter, tape, expansion, available.



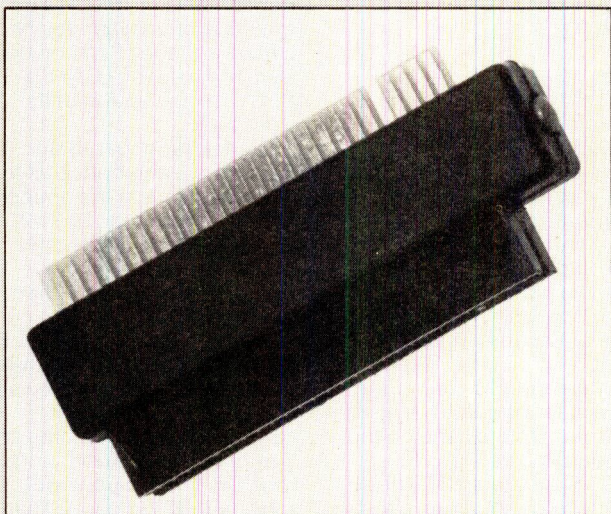
## TELEVIDEO: £1290

Completely IBM PC compatible computer with 128K memory, good-looking 14" graphics display, twin 360K disk drives. Runs Flight Simulator, Framework, 1-2-3 etc without any problems. List price £1990, unbeatable at **only £1290**. **NEW SOFTWARE AT MORSE.** IBM Topview is expected very soon. On our shelves now, Apricot WordStar 2000, Symphony, Lotus 1-2-3. etc. **Many more items too numerous too mention. All Morse prices are exclusive of VAT at 15%. E.& O.E.**

# MORSE

**MORSE COMPUTERS** 78 HIGH HOLBORN, LONDON WC1V 6LS. 01-831 0644. TELEX 916509.





**'Switching off the power on the Spectrum,' comments Nidd Valley Micro, 'to cure a program crash is about as nonsensical as switching off the National Grid to change a light bulb.'**

**What one wants is a reset button. 'The Z80 processor,' observes Nidd Valley, 'is provided with a proper reset line which gently resets the system. No power is lost to the computer or peripherals, so by using this, there is less likelihood of damage to microdrive programs. While programmable interfaces like joysticks remain programmed, only the game or program needs to be reloaded.' That's what 'reset' means.**

**Of course, but Sinclair Research always said it would add too much to the cost of the Spectrum to provide one.**

**It adds a whole £5, including VAT and delivery. It is also a quite useful extender to the back end of the Spectrum, making it easier to fit keyboards and add-ons — what more do you need to know?**

**The phone number is (0432) 864488; the address is Stepping Stones House, Thistle Hill, Knaresborough HG5 8JW, North Yorkshire.**

whatever it ends up being called, is on (0256) 463344.

## Surprise response

The Department of Education's Microelectronics in Education Programme (MEP) has learned a lot of painful lessons.

It has spent five years looking at software, and at the end of this, has produced a book with suggestions of what to do, what not to do, and how to avoid doing it, aimed at education people.

The book will be of interest to programmers and analysts, 'but we feel it will be of particular value to those who set out as producers', explains MEP director Richard Fothergill in the book's publicity blurb.

The book is entitled *Educational Software — a Creator's Handbook*. It costs a thumping £25 plus £2.88 UK postage, and the distributor is Tecmedia Ltd, 5 Granby Street, Loughborough LE11

3LD. Don't ring the MEP about it — it is delightfully 'other-worldly' about this sort of thing. I mentioned the book one day on my Oracle page (557, plug) and got a bewildered phone call from Cambridge asking why 'all these people were calling them for details?' as if the last thing the MEP had anticipated from sending out a press release was actual response.

## Mac BCPL

BCPL, an ancestor of the C language, is still much adored by programmers in Cambridge, where Top Express has now produced a version for the Apple Macintosh.

The package 'includes Mac BCPL on a disk, a demonstration program source, a complete systems manual, and a copy of a book, *BCPL: the language and its compiler*, published separately by Cambridge University Press,' explains the publicity blurb.

We fully intend to review this product in some way or

other (to follow this month's review of BBC and QL implementations), but this isn't the moment: if I put the disk into my Mac, I'll never get around to writing another word. For details, contact Top Express on (0223) 355427.

## Forward booking

A few dates for the next few months. A show for construction people using computers is scheduled for 25-27 June. At the time of writing, I know only that the Second Construction Industry Computer Fair will be held at the Barbican, but nowhere in the information sent to me on the First Construction Industry Computer Fair do the organisers mention the trivial detail of exactly where to go. I suggest you contact them on (01) 637 8991 if you are interested.

A seminar on IBM's impact in Europe is being held by Frost and Sullivan at the Hyde Park Hotel on 27-28 June. This one costs, and details of who pays how much are available from Anne Drayton on (01) 486 0334/5.

For education people, the Microcomputer Users in Education (MUSE) group is running a July Summer Course/Conference, aimed at teachers at all levels from primary to higher education. There are 26 speakers, so I will refrain from attempting a list. Details available from MUSE at PO Box 43, Hull HU1 2HD, or phone (0482) 20268.

'Bookings should be made before 1 July,' it says cryptically, 'though late applications will be regarded with sympathy.' Flowers only, please.

Finally, for personnel experts, a conference and exhibitions on Computers in Personnel is being organised by the Institute of Manpower Studies with the Institute of Personnel Management. The 'double event' will be from 9-11 July at the Royal Lancaster Hotel, London W2. Details on (0273) 686751, the Institute of Manpower Studies.

## 68000 expertise

Those experts on the 68000 (and machines like the Mac, Atari, Amiga, QL, and so on) Metacomco, has moved well up from its normal assembler programs (for all those machines, some of them still secret, heh, heh) to announce an artificial intelligence language, Cambridge Lisp 68000, 'for any machine running CP/M 68k'. It should be available on everything except the Mac, and also on things like the Stride and the Wildcat, the U-Man 1000 and the Sord 68.

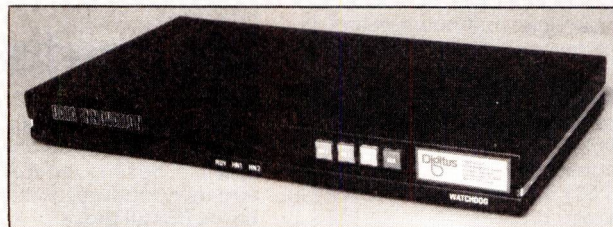
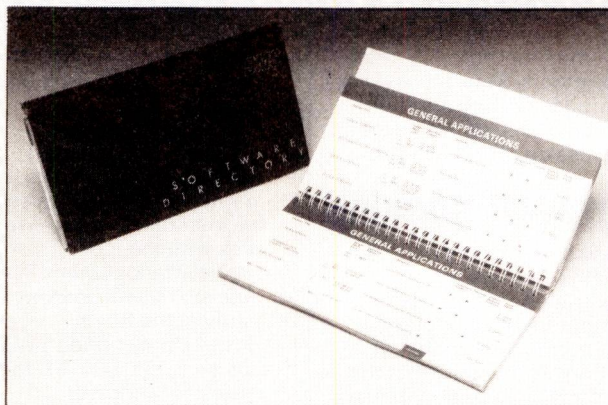
## Morals in question

It is immoral to sell someone software, and then claim that you haven't sold software but



**It could be argued that setting up a special centre to train disabled people in the skills of computing, as Rank Xerox has just done, isn't going to get the company's profits up — so it must be a search for publicity. Well, if it is (and getting Prince Charles along to open the ITeC in Slough does support this theory) it will always work in this column. The photo shows the gym — part of ITeC's overall rehabilitation course. I'm delighted to see this collaboration between the company and the local authority, and look forward to seeing reports of the trainees getting jobs in our short-staffed industry.**





**It seems to be HiNet's month. The little booklet in the first picture is a software directory. Before you scoff at its slimness, I ought to warn you that it is highly unusual — it's a guide to software which runs on a local area net, Digital Microsystems HiNet.**

**Networkable software is rare, and a 153-page booklet is very fat by network standards.**

**Not all the products here are guaranteed to work, but they do at least run. They are classified under three headings, showing how much research has been done: those that have been 'run', then those which have been 'tested', and finally, and most impressive, those which have been 'installed' — actually taken to a user network, loaded, and proved to work properly.**

**You can't run them all because they use different operating systems, but they include languages, databases, communications packages, spreadsheets, word processing and Cad/Cam packages, as well as vertical market products and accounting applications.**

**The other picture shows a Watchdog. It, too, runs on HiNet, and is an invention of Digitus. Without going into needless detail, it takes control of a HiNet network if the master station fails. Details on (01) 379 6968 from Tim Edgar, who will also have some knowledge of the DMS software catalogue, or contact DMS direct on (0734) 793131.**

a tape with software on it. It's immoral because if I have a program, I want to load it from tape only if I don't have a disk. And the cost of transferring it to disk is the effort of 10 minutes of my time.

I know I've got into trouble before on this subject but my opinions remain the same, even when it's the BBC which is asking buyers to spend £12.45 on a program (Vu-Type) which they already own. The program costs £18.40 on disk, and the BBC is very 'generously' offering a discount to owners of the tape version.

The reason BBC Software has to do this is that it has protected the tape, and theoretically you can't copy it.

Naturally, most users by now have utilities which do this for them. For those who don't, I seriously suggest that the BBC (and other publishers) offer a free upgrade, charging only the price of the disk and postage. I suggest it in their own interests — if the only disk copies lying around are ones made by hackers, you can bet they won't be copy-protected. And this policy is exactly designed to guarantee that the only disk versions will be hacker-generated.

If you agree with me, feel free to contact BBC Software at 35 Marylebone High St, London W1M 4AA, tel: (01) 927 4218 and write to PCW whether you agree or not, the issue of upgrading to disk isn't going to go away.

## Amstrad azimuth

People with difficulties loading software (unless they have been stuck with one of the new, 'improved' Commodore tape drives that won't recognise old Turboload tapes) often find that the playback head on their unit isn't exactly where it was on the unit that made the tape.

Interceptor Micros report high sales of a kit to adjust the 'azimuth' of the head on the 64, and has now produced one for the Amstrad. The £9 kit includes software, a test program, a manual, a special screwdriver and a pointer.

It is available from retailers, or contact Interceptor on (07356) 71505.

Apparently, a Spectrum version is on the way, a prospect which fascinates me since Spectrum users don't have standard tape drives.

## The proof's in the running

Minicomputer-builder DEC has a bone to pick with micro-maker Intel: apparently, Intel has been telling fibs about how fast its micros are, compared with DEC's minis.

In 1981, an American magazine (*Byte*) supposedly printed a Benchmark which Intel picked to illustrate the power of its System 86/330. When Intel ran the

Benchmarks in 1982, it said that its system was 'clearly superior to the LSI-11 on this Benchmark'. The LSI-11 is DEC's micro version of its PDP mini.

Digital has now run the Benchmark and finds that 'on the contrary, just the opposite is true — both the LSI-11/2 and 11/23 executed the Benchmark faster and required less memory than the System 86/330'.

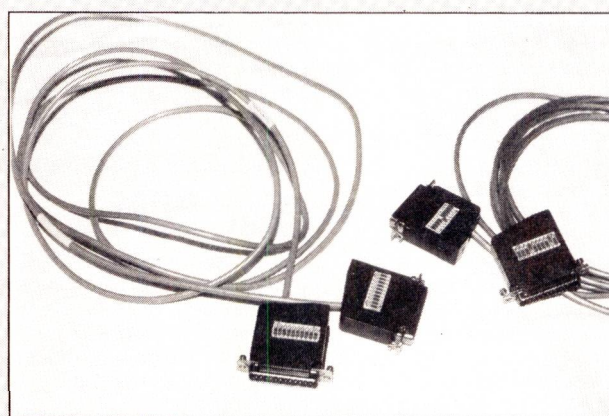
All good fun. What I found fascinating was the fact that this (Pascal) Benchmark was tried out on 20 different combinations of machine and compiler; the fastest being the PDP-11/70, a powerful mini, with NBS Pascal. That took 2.6 seconds, compared with the Intel system's 9.20 seconds. The best 8-bit system was a Z80 with MT+Pascal, taking 19 seconds.

No, that isn't the amusing bit. The amusing bit is the time taken by the Apple II with UCSD Pascal. It took 516 seconds...

## Goodwill to all men

The reason modem-maker OEL called in the receivers earlier this year was partly a question of bad debts from Prism and Oric, and partly the failure of a chip maker to produce a central processor on time.

The company made the QL modem, which has been announced but not shipped,



**The cable you want for connecting a computer to a modem is, after all, never quite what you thought. This switch-configurable cable can overcome most of those problems and, what is more, if you have two devices, you can switch it for both. And it looks like coming onto the market at around £30, which is only very little more than the cost of an ordinary cable. If you have trouble finding a dealer, ask for Tri-Point on (01) 669 6502, or contact Ferrari Software, P&P Micro Distributors, Westrex, MT Direct, Norbain Micro, and Stack Computer Services.**



# QUME

**'originals'**

## Best for the Qume family of printers

Qume ribbons, developed and refined by Qume and made in Britain for use with all Qume Printers here in the U.K. and in Europe.

Why gamble with imitations, when, for a very small premium you can get Qume Originals. The best ribbons for all Qume Printers without a doubt.

Be sure your printer sees "red" when you fit your next Multistrike I, Multistrike II, or Multistrike IV.



**Qume**<sup>®</sup>  
Qume (UK) Limited,

Marketing and Sales

Park Way, Newbury, Berkshire RG13 1EE  
Telephone: (0635) 31400 Telex: 846321

Service and Training Centre

Bridgewater Close, Reading, Berkshire RG3 1JT  
Telephone: (0734) 584646 Telex: 849706

A British Company of **ITT**





It's amazing what  
you can squeeze out  
of an apricot.

PIPS • DATASTREAM • TEXTLINE • INFOLINE • TELECOM GOLD • ELECTRONIC  
BACSPAY • EXTEL PRICELINE • DATASTAR • EASYLINK • XETEL • SERVICES  
DUN & BRADSTREET • EUROLEX • PRESTEL • VALUATIONS • EXTRACTS •  
ELECTRONIC INFORMATION AND SERVICES  
INTERNATIONAL NEWS EXTRACTS  
COMPANY STATISTICS  
AL DATABASE  
LEG SHARE PRICING  
ELECTRONIC MAIL TELEX  
INTERNATIONAL BUSINESS  
TELEX BUSINESS INFORMATION PORTFOLIO  
COMPANY ST  
PORTFOLIO



Anybody in business who is hungry for information should seriously consider Communiqué, a service exclusive to owners of Apricot computers.

For a modest outlay of £395 + VAT you gain access to a mind-boggling array of information.

First you fit the modem and then slot the Communiqué disk into any one of Apricot's wide range.

You can then plug your computer into the telephone system and all the information services Communiqué has to offer.

No other computer offers so much from a single monitor. Included in the basic package is free access to the Telecom Gold system.

This electronic mail facility enables you to despatch printed material from computer to computer, office to office, in the twinkling of an eye.

By the same token, Easy-link offers you a worldwide, low cost, telex service operating from your desktop computer.

#### THE JUICIEST FACTS AND FIGURES.

Communiqué saves you money and the time spent ploughing through a mountain of desk research.

One press of a button on your Apricot keyboard and over 300,000 pages of Prestel information and services are yours for the asking.

Questions regarding almost a million of the UK's registered companies will be answered by Pergamon Infoline.

For digests of financial and business-based articles published worldwide, simply call on the services of either Data-Star or Textline.

The latest prices, investment ratios and share tables are all brought to your desk by Extel Priceline at the touch of a button.

Solicitors and Accountants will find Euro-

lex particularly relevant and useful.

This provides you with a legal database, taxation details as well as case histories.

We've barely scratched the surface of the services Apricot's Communiqué has to offer here but, as you will have gathered by now, what it does provide is an absolute torrent of topical information.

#### THE PICK OF THE CROP.

Whereas you would normally need a separate telex and monitor for each of these services, one Apricot computer acts as your fount of all knowledge.

Each can be locally networked as well as being perfectly happy to work under its own steam.

To make Apricots even sweeter, they are fully capable of interfacing with mini and mainframe computers.

Furthermore, if you are responsible for your firm's accounts, Apricot Accountant makes it all a piece of cake.

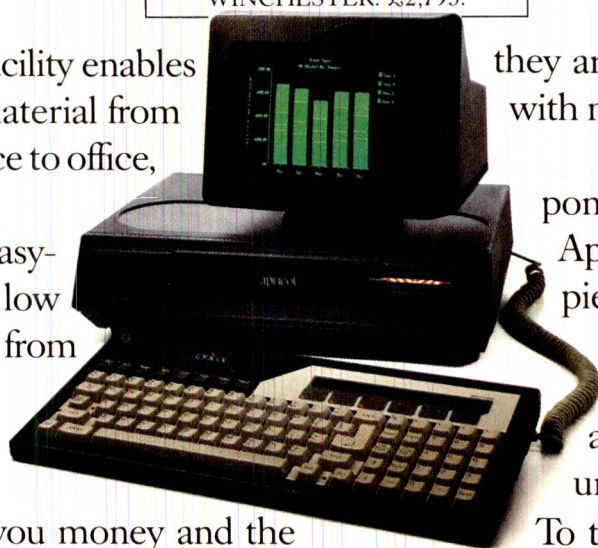
It's an accountancy software system that takes away all the time and boring effort in unnecessarily shuffling paper.

To top the lot, Apricot computers have the largest published library of software in the UK. Whatever your needs, we can meet them in 3,000 different ways.

And that includes the best-selling business software in the world, Lotus 1-2-3 as well as Symphony, their new all-in-one system for managers and professionals.

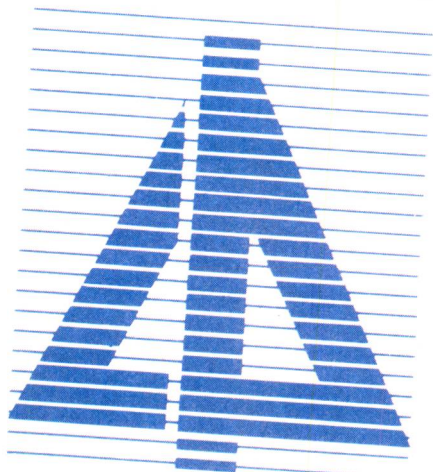
If we have whetted your appetite for Apricots and Communiqué call in one of our dealers.

They're more than happy for you to squeeze more information out of them.



 **apricot**  
COMMUNIQUÉ





COCKING & DRURY LTD.

## A SINGLE SOURCE FOR APL

▲ Consultancy & Programming

▲ APL\*PLUS software

▲ Education

▲ Support

▲ Packages

▲ Turnkey Systems

Please send me information on:

- ☐ Consultancy & Programming
- ☐ APL\*PLUS/PC
- ☐ APL\*PLUS/UNIX
- ☐ APL\*PLUS for the mainframe environment
- ☐ Turnkey Systems
- ☐ My need is urgent - please phone me

- ☐ APL Courses
- ☐ APL Packages
- ☐ Hot-line support
- ☐ Statgraphics,  
PC Statistical  
Graphics Software

Name \_\_\_\_\_

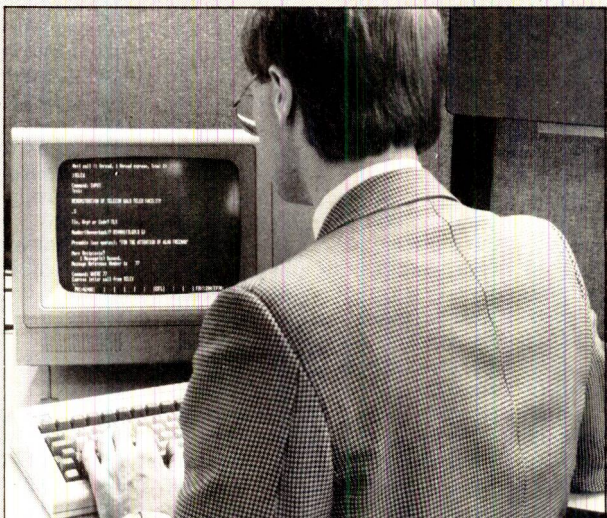
Address \_\_\_\_\_

Postcode \_\_\_\_\_

Phone \_\_\_\_\_

Please send to: **COCKING & DRURY LTD, FREEPOST 34, LONDON, W1E 7QZ**





**This man is reading a telex which has arrived on his Telecom Gold electronic mailbox. It cost him 50p.**

**The service is welcome: it had previously been possible to use Gold to send telexes, but not to receive them. Nonetheless, I'm a bit disappointed. There was an exciting-sounding development related to the telex service: 'A simple routine is also available', said the announcement, 'which will convert standard telex upper-case format into lower-case, making text much simpler for the recipient to edit when required.'**

**This can be quite easily done, of course, with the CP/M command PIP, so hardly warrants much fuss. What I had been hoping for, however, was something more clever — some way of providing upper and lower case through telex.**

**Without doing any research at all (well, I wrote to Telecom Gold, but since I used electronic mail, I have only myself to blame for not having received an answer) it occurs to me that telex uses several 'invisible' characters. For example, the NUMBERS character switches from alpha to numeric, and back. Two NUMBERS characters sent together could be interpreted as a depression of a SHIFT LOCK key by Gold users, but would be totally ignored by telex machines.**

**I'm sure there's a very good reason why that won't work, and I'm almost sure that one day, Telecom Gold executives will read their mailboxes and tell me why... but don't hold your breath waiting for the answer.**

and had announced (and started shipping) a teletext adaptor.

The teletext adaptor (for the Spectrum) was publicised on 4-Tel, Channel 4's own Oracle-based service which has dreams of publishing software for Spectrum owners. However, in the absence of any software, the adaptor was only useful for people who wanted to read Oracle. And since, to read the ads, you had to have Oracle anyway, sales of two decoders were quite impressive, really.

The QL modem is apparently completed, working and approved, but late. Its central microprocessor has 4k of code built into it at the factory, and Texas Instruments was given the order after General Instrument failed to deliver, say staff. They don't blame Texas for having it late — it

takes time to design a chip mask including 4k of program, and build the part. But late it was, which meant long costs and no revenue.

At that point, according to managing director Martin Ansell, one of his biggest backers, a flour-making group, pulled out. Other people hoping to put money in weren't quick enough or eager enough, and the receiver had to be called.

For customers, of course, this is good news. Send money to a company which is struggling, and you are likely to get a note from the receiver pointing out that you are now an 'unsecured creditor' and good-bye money. Send money to a company being run by the receiver, and you will get your goods.

For those people in the industry who have written software, supplied prototypes, and extended

credit, of course, it is a disaster, and their only hope is that the QL modem looks a sufficiently convincing 'winner' for the receiver to be able to sell off the company as a going concern.

The goodwill inside the group is encouraging: the factory staff were working for two weeks without pay after being laid off, before the receiver was called in, in order to try to keep the company going.

## Where Unix goes, others follow

It's not a bandwagon I feel like jumping on, but the Unix one certainly looks like being it's beginning to roll.

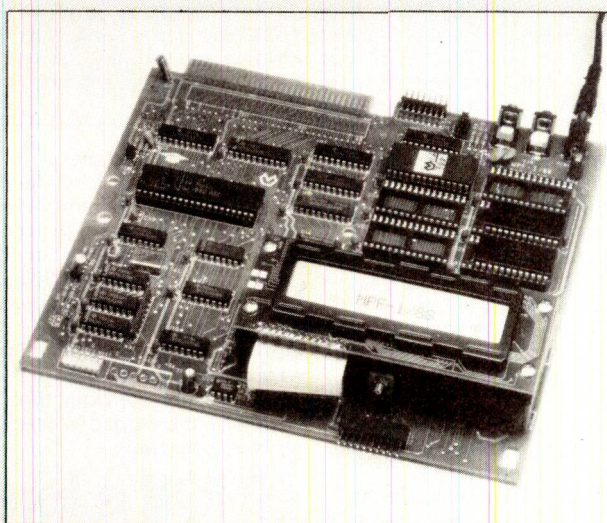
The business industry's big guns, IBM and AT&T, neither of whom get all their shots on target, are both on there — plus a host of other companies including Hewlett-Packard (whose Integral PC is reviewed in this issue) and Commodore, which has been receiving some bad publicity recently.

Systems house Digitus, for one, is convinced that the operating system's time has come. It's published a £95 report on the Unix market which says that 'with sales doubling in 1984 and 180 per

cent growth predicted by 1986, it is set to become one of the most dominant multi-user systems'. However, Digitus doesn't expect the shortage of IBM PC/ATs to be corrected until the end of the year, and it's even less optimistic about multi-user Xenix. This AT implementation of the Microsoft Unix lookalike isn't expected until next year.

To make life even more confusing, Commodore's contender is based on another Unix clone, Coherent. The Commodore machine should come in two versions, both called the 900. There's a personal workstation with a very high-resolution (1024x800) bit-mapped monitor coupled with Commodore window manager software and mouse control, or alternately you can plump for the multi-user option with a 67Mbyte hard disk from which you can hang up to eight terminals. Both versions come with 512k of RAM as standard, and are based on an obscure Zilog 16-bit processor, and Z-8001. Coherent at the moment is compatible with System Seven Unix, but will in time be made compatible with the more widely available System Five, says Commodore.

The best I could get in the way of a price is 'approximately half the price of its nearest rival' or 'very



**At £325, this little card is a really nostalgic look into the roots of the micro industry — it's a development card with an 8088 chip on it, designed for teaching hardware and software engineering with the Intel processor. You can attach wires to literally anything you like, in contrast to the packaged electronics of most MS-DOS office systems, and you can work like mad for months, coming up with something that rings a bell. But you will be an expert at the end of the process.**

**Contact Fight Electronics for details of the MPF 1/88, on (0703) 34003.**





**Another triumph of ingenuity over sense: the Seiko RC-1000 is 'the world's smallest computer terminal'. It is 'an ingenious way of carrying data which would normally be kept at home in a personal computer'.**

**You feed the information from your home micro into the wristwatch, and later you can scan through 80 'pages' of 24 characters each, with phone numbers, reminders...**

**No I don't believe it either, and it did arrive at the end of March. But a horrible, sinking feeling tells me that if you ring Hattori UK (publicity agents Headway Public Relations will take calls on (01) 379 6339), the company will not say 'April Fool', but will take your money.**

**There's no accounting for the mountains people will climb just to prove they can do it.**

competitive', which could mean anything between £2500 and £7500. Delivery starts towards the end of 1985, although software developers are getting the machines now.

For me, optimism based on Unix is misplaced optimism, but I'm pleased to be able to record it so that we can look back with hindsight in a year's time. AT&T is placing its future trust on its 7300 personal micro, which looks like a Macintosh but runs Unix software.

That machine uses the 68000 processor, a close relative to the one inside the Macintosh, but don't run away with the idea that programs will need relatively little conversion from Mac to Bell.

Most programs written for the Mac don't address the chip but use the high-level

routines built into the Macintosh by Apple. Unless AT&T produces an emulator of the window manager, there is going to be a whole host of nothing to run on the 7300 for a long time. Except, of course, for the possibility of converting Xenix applications — and despite the theory that Xenix is very like Unix, that won't be the work of a couple of weeks, either.

## CD ROM is here!

It looks as though compact disk ROMs are finally arriving with the announcement by Hitachi of the CDR-1502S — a CD-ROM with parallel interface for the IBM PC. Memory is not quite up to the one giga-byte first speculated, with the Hitachi drives storing 522Mbytes which is still about 270,000 A4 pages. Interfaces for other machines are

expected later this year. Happily it is using the same mechanism as the music compact disks so we can expect the price to drop as music CDs drop and the disks themselves should be relatively abundant.

The CDR-1502S is expected to sell for just under £1000 which is twice the price of its audio counterpart, apparently the addition of an extra chip will allow it to be used as an audio-CD player which makes it sound more reasonable. A number of computer manufacturers have expressed an interest in it with a view to replacing their bulky instruction manuals with a single disk. In addition it seems as if the race is on between the CD-ROM manufacturers to sign a deal with Encyclopedia Britannica to be the first to offer this on CD.

## Acorn anti-climax

If you've been holding your breath waiting to see what Acorn does next, news of the BBC B+ is likely to leave you a little disappointed.

The machine provides 64k of RAM and two more ROM sockets. Oh yes, and all the ROM sockets have been moved to make them easier to get at. That's about it, although the disk interface chip is included in the expected recommended retail price of £499.

Seemingly, BBC B prices will be cut with the availability of the new model, but no-one would tell me by how much — the phrase used was that 'price differentials between models will be maintained'.

Not much was being said about the Communicator either, which will appear first as an OEM machine, probably in the autumn. Meanwhile, the ABC 200s are scheduled to continue under the Acorn name, pitched at the scientific market, while the 300s are also waiting for an OEM deal.

## The Show principle

On the principle that PCW readers are busy people who like to plan ahead, I've some early details on this year's PCW Show.

The Olympia centre in west London is the venue again, and the dates to note in your diary are Wednesday to

Sunday, 4-8 September.

But this year's event has something of a new look. The Olympia 2 hall is set aside for business computing, while all the action for home computers is next door in the National hall. That's where the big names like Acorn, Atari, Commodore and Sinclair will be, together with all the related software and peripherals.

New features in the National hall include Tomorrow's Micro Home, where one of the MSX companies will give a glimpse of its vision of the future, with the computer at the centre of the 'wired living room'. Old favourites in this area include the Top 20 Games and, of course, the Association of Computer Clubs, which will have a larger presence than in previous years.

In Olympia 2, visitors will be able to get impartial advice on choosing a micro for business, courtesy of the NCC Microsystems Centre. The NCC will be running daily seminars at the show, and will also have a stand to which visitors can take individual queries.

Philip Virgo, the centre's end-user systems manager, reckons that buying a micro system in the early 1980s 'is like buying a delivery van in the early 1920s. The world is full of enthusiastic amateurs and ex-chauffeurs discussing the relative merits of Raleigh Runabouts and Rolls-Royces, united only in their denigration of the Model T Ford'. The NCC promises to provide a more sensible approach.

Also in the business area will be the PCW Show applications advisory service. If you want to know exactly what software is available for your particular business problem, that will be the place to ask: the database directory will list all known applications software. This hall has its own entrance, with separate ticketing for trade and business visitors who can register in advance to walk straight in at the door.

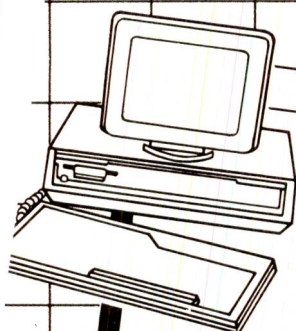
Further details from: PCW Show, 11 Manchester Square, London W1M 5AB. **END**

**Guy Kewney can be contacted on electronic mail. His numbers are Source TCK 106, and Telecom Gold 81: JDS018. The Prestel mailbox number is 01-802 2679.**



# COMPUTER DISCOUNT STORE

## VALUE AND SERVICE



SYSTEM · 1

### APRICOT XI

Hard Disk + Free Printer  
+ Free Integrated Accounts Software  
including Payroll Training & Installation

**£2495** + VAT

SYSTEM · 2

### COMMODORE PC-10

(IBM Compatible)  
256K RAM Free  
Accounting Suite  
including Payroll



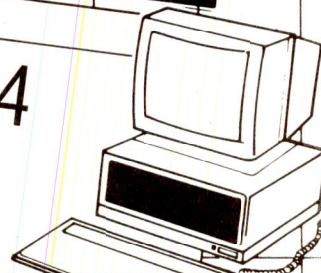
**£3645** + VAT

SYSTEM · 4

### OLIVETTI M24

Twin Floppy  
+ Free Accounts Software

ALSO AVAILABLE  
10 Megabyte Hard Disk  
£2895 + VAT



**£1645** + VAT

SYSTEM · 3

### APRICOT F1

720K Disk 256K Memory  
includes Free Integrated Accounts  
Software or Printer

**£1195** + VAT

SYSTEM · 6

### IBM XT

Hard Disk + Accounts Package  
including Payroll + Free Printer



**£3645** + VAT

SYSTEM · 5

### APRICOT TWIN DISK

+ Free Word Processor  
+ Free Printer

**£1445** + VAT

SYSTEM · 8

### EVALUATION SYSTEMS

AVAILABLE FROM £100 per week  
ALSO AVAILABLE  
RENTAL SYSTEMS  
FROM  
£40 per week

**£100** + VAT

SYSTEM · 7

### ZENITH Z150

(IBM Compatible) Twin Floppy + Free  
Accounts Software  
ALSO AVAILABLE 10 Megabyte Hard Disk  
£2845 + VAT

**£1645** + VAT

COMPUTER DISCOUNT STORE  
58 Mount Stuart Square, Cardiff CF1 6DR  
Tel: (0222) 488650/488641





*When you can't see the shelves for the software, there must be another way of selling. David Ahl reports from the States on electronic distribution and the latest American news*

## The hard sell

With over 27,000 personal computer software packages on the market, it's impossible for a computer store to carry more than about 1 per cent of the total offerings. Even the largest software distributors, Softsel and First Software, carry less than 20 per cent. Thus, software manufacturers are turning to a variety of other methods of selling their wares.

Some vendors saw electronic distribution as the answer, but it has not proved commercially successful. Nevertheless, General Electric, AT&T and several new companies are continuing to experiment with such systems, and are convinced they will be in widespread use by the end of the decade.

An alternative to direct electronic distribution is provided by One Point, a distributor that maintains an electronic software catalogue of some 7000 titles. A customer can dial up the catalogue from his home computer or one in a retail store, and receive product descriptions and reviews of packages. If he is interested, he can place an order which will be shipped within 48 hours.

Unimart is trying an approach which allows a customer to dial up a software package and try it out with his own data. If he likes it, he can buy it.

Several software vendors have turned to outlets other than the traditional computer or software store. Intuit, for example, sells its home finance package through banks. Several vendors sell packages through trade associations, and at least one vendor sells its package through home builders who include a computer and a home management software

system in every new home that they build.

## Away from home?

Although some industry watchers have interpreted IBM's decision to stop producing the PCjr as the death knell for the home market, I disagree. The PCjr never completely recovered from its initial introduction in the US with a Chiclet-style keyboard and limited expansion capabilities, although the deep price cuts for a bundled system before Christmas gave it a short-term boost.

If anything, IBM's exit provides some opportunities for Apple and Tandy who currently market full-featured systems in the under-\$1000 price range.

Later this year when the new Commodore and Atari computers hit the shelves, the competition will be tough but the time window seems to be wide open for Apple and Tandy for the next few months.

Is IBM out of the home market for good? Not likely. It is reportedly still looking at building an MSX machine at a very attractive price, and you can be sure that when IBM sees significant profits in the market, it will jump back in with both feet.

Meanwhile, the bundled PCjr price of late 1984 prompted Apple into responding with a cash rebate program on the Apple II. Although the program ended on 30 April, it still caused a (needless) loss of revenue for Apple.

## Below target

Kaypro, with its cheap but functional computers and direct distribution to retailers, was riding high a year ago while companies with more advanced products and 'proven' distribution schemes were hurting.

However, an antitrust complaint was filed against Kaypro in March for threatening some of its

dealers with termination for not selling at list prices.

Kaypro paid \$19,500 in civil penalties and court costs to settle the suit and, although the company did not admit or deny the allegations, it would appear that it will now have to give its dealers greater latitude of action in setting prices, selling to non-Kaypro dealers, and advertising mail order sales.

Dealers have also expressed scepticism that Kaypro has the ability to support its recently-announced 286i, a high-end IBM PC/AT clone, or even the K-16, and XT-type entry. The 80286-based 286i with 512k and dual floppy disk drives sells for \$4550, while a 256k, 10Mbyte hard disk version of the K-16 sells for \$3295. All Kaypro systems include bundled software. Although the Kaypro prices are 18-25 per cent under the cost of similar IBM units, the IBM systems are frequently discounted by approximately 20 per cent. Therefore, the only advantage of the Kaypro is the bundled software.

Several dealers to whom I've spoken feel that the extra software — said to be worth \$2000 by a Kaypro spokesman — is not enough. After all, Columbia, Eagle and TeleVideo also had a price advantage and were largely unsuccessful against IBM. Most dealers agree that while many customers are looking for an alternative to IBM, the three magical letters — I, B and M — are still the most sought.

One said: 'I hope Kaypro can do in the AT world what Compaq did in the PC world, but they're going to have a tough, tough time.'

## Random bits

The Software Publishers Association reports that sales of Macintosh software have jumped from nil to 8 per cent in early 1985. In March, Compaq shipped its 200,000th personal computer. IDC predicts that the market for business graphics will grow from \$59 million in 1984 to

over \$1 billion in 1989.

Acorn has had a tough time in the US market, but may get an unexpected boost from Olivetti's 49.3 per cent stake in the company. AT&T, 25 per cent owner of Olivetti, is said to be considering an agreement to help Acorn crack the US education market, now dominated by Apple. Consumer Products, a maverick division of giant AT&T, has released an image capture board (for the IBM PC) which captures a standard composite video image, and allows modification and manipulation of it by the computer. It is made possible by the development of a new design architecture using RARAM memory, a high-density, low cost, two-port dynamic memory with a very fast access time. Having discontinued its 16/8 and 820 family of computers in February, Xerox is negotiating with Olivetti to sell the M-24 IBM-compatible unit. Lotus and Cullinet have joined forces to develop and market products to connect Lotus 1-2-3 and Symphony to powerful IBM (and compatible) mainframe computers. One catch: while the integrated package, Symphony Link, is expected to cost only \$300 to \$500, customers will have to buy a communications peripheral for each PC (about \$1100 each) plus Cullinet's mainframe Information Centre Management System package for a cool \$150,000. Its no secret that videotext has been a colossal failure in the US. The operators of three experimental systems (Viewtron, Keyfax, and Gateway) spent a total of \$90 million in development yet attracted fewer than 5000 subscribers in total. Nevertheless, even bigger players are planning to enter the business, specifically three joint ventures: one between IBM, CBS and Sears; a second between AT&T, Time Inc, Bank of America and Chemical Bank; and a third between RCA, Citicorp and a third unnamed partner.

END



# TAKE OFF WITH A TOUGH NEW BREED

IT'S YOUR CHANCE TO WIN THE FLIGHT OF A LIFETIME IN THE FUJI AIRSHIP. TO ENTER OUR GRAND DRAW SIMPLY PHONE (01) 200-0-200 AND LEAVE YOUR NAME, ADDRESS AND TELEPHONE No. AND TELL US WHICH LOCATION YOU'D LIKE TO LEAVE FROM, AND WE'LL LET 50 LUCKY WINNERS KNOW AFTER OUR PRIZE DRAW ON TUESDAY 28th MAY.

50  
FLIGHTS  
TO BE WON



FUJI'S TOUGH NEW BREED OF FLOPPY DISK DEFINES NEW INDUSTRY STANDARDS FOR SAFETY, DURABILITY AND DATA CAPACITY ON MAGNETIC MEDIA.

THE SUPER THIN HUB RING IS A BREAKTHROUGH, MAKING OFF TRACKING A THING OF THE PAST. EACH DOUBLY TESTED CERTIFIED DISK IS GUARANTEED FOR AT LEAST 20,000,000 PASSES AND FUJI'S ADVANCED COATING TECHNOLOGY MEANS LOWER MODULATION AND HIGHER STORAGE CAPACITY.

Flights to take place during June 1985.  
Each flight will last approximately 45 minutes.  
Flights will be subject to weather conditions.



## FUJI FILM FLOPPY DISK

Cresta House, 125 Finchley Road, London NW3 6JH. Tel: 01-586 5900

## DEFINING THE STANDARDS

SHIP LOCATIONS:  
LONDON  
LEICESTER  
SHEFFIELD  
MANCHESTER  
BIRMINGHAM  
BRISTOL  
PORTSMOUTH





**93,652\***

**PERSONAL COMPUTER WORLD BUYERS**



**CAN'T BE  
WRONG**

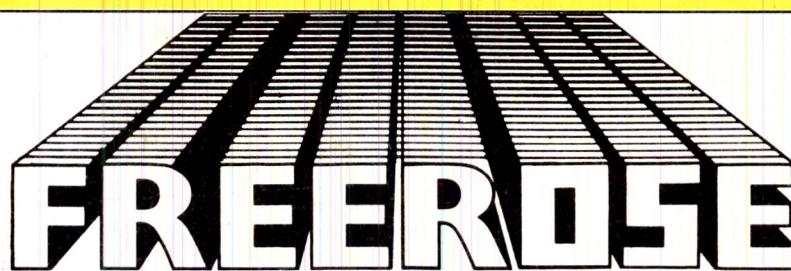


**SUBSCRIBE NOW—SAVE POUNDS!**

\*ABC Jan-Dec 1984 93,652



**A DISTRIBUTORS STRENGTH IS IN ITS RETAILERS**



**FREEROSE**



**BACKS**

**FUJI**

**CERTIFIED AND  
TESTED 100%  
ERROR FREE**

**AND YOU?**

Join us: Ring 01-405 1430/01-405 9565  
or visit us at our showroom between 10am and 5pm — Monday to Friday

**FREEROSE LTD** Computer Division  
24 St Cross Street  
Hatton Garden  
London EC1N 8DX

MAIN DISTRIBUTORS  
OF MAXELL, FUJI, 3M  
FLOPPY DISKS



# Get your ACT<sup>TM</sup> together- with a high performance disc drive system

Alpha Disc Ltd are pleased to announce the launch of their exciting XF floppy drive sub-system, targeted for the Apricot PC, XI and F1 market.

The basic unit comprises a slim 80 track double sided 5.25" floppy disc drive, giving a formatted capacity of 800 Kb. The drive comes complete with MS-DOS driver software and interface/controller card, which locates in one of the expansion slots on the Apricot PC XI or F1. The sub-system is thus configured as a second or third drive, with a capacity exceeding that of the Apricot's own double sided micro-floppy.



## **FX-800 IBM-PC/Apricot compatible floppy disc drive.**

**Description.** Add-on 5¼" floppy disc drive with plug-in interface/controller which allows software compatibility between the Apricot PC, XI & F1 range and the IBM-PC computers running MS-DOS/PC-DOS.

- IBM-PC DOS compatibility
- Ability to format discs in IBM mode
- 800K formatted capacity 80 track double sided floppy disc drive
- 80 track/40 track switching on drive for maximum flexibility
- MS-DOS driver software
- Optional 2nd additional drive
- Independant power supply

**Price £495 + VAT.**

## **F1-800 Apricot F1 – floppy disc drive sub-system.**

**Description.** Add-on 5¼" floppy or 3½" Sony micro floppy disc drive which allows you to considerably expand your on-line storage capacity by up to a massive 800K (1600K with 2 additional drives).

- 800K formatted capacity 80 track double sided floppy disc drive.
- Disc drive controller
- MS-DOS driver software
- Independant power supply
- Connects through expansion port
- Optional 2nd additional drive

**Price £395 + VAT.**



**ALPHA DISC LTD**

UNIT 2 CRABTREE ROAD THORPE INDUSTRIAL ESTATE EGHAM SURREY TW20 8RN

TELEPHONE (0784) 35357/8/9 TELEX 918886 ALPHAD G.





## Oh no, not again!

I am typing this on my week-old Amstrad CPC 464 (called 'Arnold', I believe) and I am hooked! The printer is borrowed but the word processor is the free one with the machine, and it is good enough for my typing.

I am also becoming hooked on PCW and I like the artwork — especially March, page 153 — but my wife wants to know where the bowl of petunias and the whale went? She must have been Hitch-hiking again.

**John H Taylor, Craigavad, Co Down**

*The mice nibbled away the petunias and whale — much to the annoyance of the illustrator Eddi Gornall. These scientific mice just have no respect for art.*

## Programs, please

I am a lecturer at a college of further education in the Cleveland area. Having previously worked as a microprocessor development engineer, I knew the type of systems that were available in the 'real world' and the capabilities of such systems. One of my responsibilities is the development of courses in assembly languages and interfacing techniques.

In the latter part of 1983, I did a major search of the then current personal computers with a view to choosing one which would become the basis for the development of such courses. The system I chose was the Memotech MTX512. The main reasons behind this choice were:

i) Integration of Basic, Z80 assembler and a text processing language Noddy.

ii) An easy upgrade route to a full CP/M system.

iii) Robustness, a feature not unnecessary in this situation.

iv) The whole system cost was very small in comparison with similar systems. In fact, an entire laboratory was equipped with 13 MTX512s and two full CP/M systems for well under £4000. The systems are used for software development, and code which is produced is transferred downline to EPROM programmers.

Since the launch of the machine in late '83, there has been considerable work put into the formation of a vibrant user group, GENPAT, whose current membership spans a great deal of Europe and beyond. The group offers substantial discounts on both hardware and software as well as providing a telephone problem answering service.

Since the launch and early reviews of the system, there has been an almost total lack of interest in the machine. While I realise that there are several good machines on the market, there seems to be no interest in producing articles and/or reviews of current software or add-ons. This is shown most graphically in that, in current magazines, there are major programs being written for machines that are now totally unavailable (by any means) and reviews of some of the earliest software written for the MTX series in 1983, with no mention of current, vastly more powerful software. At the present time there are available, via GENPAT's own software house, Syntax software, or from others, in excess of 100 titles, ranging from word processor packages to games.

It includes macro assemblers which are comparable in power with ones used in industry, other languages such as Pascal and Forth, several utility programs, one of which for example allows printing of current programs while doing other things — that is, a spooler program, and a whole host of games, several of which are unique to the MTX series.

I write this in the hope that it may stir into action some

thought of producing software for a very good machine.

**Terry Trotter, Billingham, Cleveland**

*You'll get no disagreement from us about the machine's quality — see our review of the RS128 (October 1984). But we only receive rare submissions for T.J's Workshop and Program File (see page 212 T.J's Workshop for one such Memotech program). Our Memotech is ready and waiting — what we need now is more software. And your point on reviews has been noted and will be acted upon.*

## Star failure

We have had a North Star Dimension running in our office since August '84, and while we are generally very pleased with the machine we would like to comment on several statements made in your review (PCW, March 1985) in the light of our experience.

First and foremost, the machine is very cost effective provided that the user is running standard software tailored for the machine (for example, Pegasus accounts that we use). However, we have had to rely on IBM documentation for both hardware and MS-DOS in order to do any serious programming of our own, and even then some things don't work. The system software that came with our machine was version 1.0.2, which does have some bugs in it. We were promised a free update to a true multi-user system 'within a few months' — this has not materialised and we are very disappointed, particularly as the Pegasus accounting system allows shared access to files.

The review mentions a *Technical Manual* which we understood did not come with the machine. We have had a copy on order since September '84 and it has still not arrived, despite repeated requests and reminders. Our *Users' Guide* was not hard-bound and easily gets lost. The *DOS manual* does not have enough information in it to allow the user to write device drivers for the serial or

parallel ports. We understood that a *Programmers Guide* would be available early in 1985; needless to say, this has not materialised either.

We consider that the memory expansion prices are unreasonably high, as 128k of RAM these days costs about £60 — if the price was nearer to £150, we would buy. I suspect that we will end up manufacturing our own and perhaps offering it to others.

The review mentions the fact that the fan is rather noisy and we would agree. In fact, we have had independent measurements made by Acoustic Management Systems Ltd that indicate a sound level of 59dBA at one metre. This level is approximately 6dBA above what would be considered reasonable in a modest-sized office. The nature of the noise is particularly obtrusive and, we believe, merits investigation.

Finally, any intending purchaser should make certain that any 'promises' made at or before the time of sale are sufficiently documented to allow pressure to be brought to bear if they are not kept.

It is a pity that such an excellent machine should be hamstrung by such niggling problems.  
**J L Oliver, technical director, Spectrum Audio Ltd, London**  
*Sad to say, after-sales problems aren't restricted to only the Dimension. Before buying any system, a written statement should be obtained to make sure promises are kept. But not all experiences are bad — as the next letter shows.*

## Star success

Back in October 1984, I upgraded my 48k Spectrum to do word processing by purchasing Microdrives, an Interface 1, and a Star Delta 10 printer. I chose the Star for several reasons — Epson compatibility, serial and parallel interfaces, 8k buffer and low cost (for so many features).

Unfortunately, the machine would only operate with the Spectrum at 1200 baud in text mode. In graphics mode, spurious characters kept



appearing at regular intervals. Having consulted many sources here in Riyadh, I still was unable to print graphics successfully, so I wrote to Star's head office in Germany and to the technical support group in California.

Less than three weeks later, Star Germany sent me a brand new serial interface board (its latest version) free of charge, and the technical support group sent me the latest manual — also free of charge. Both these items were accompanied by covering letters containing detailed answers to some technical questions I had asked.

The new Interface board works faultlessly at 9600 baud with the Spectrum, and the manual is full of useful programs to help me get the most from the printer (even though the Spectrum is not actually mentioned).

All in all, Star deserves a lot of praise as far as I am concerned. After all, service like this from a large company is not too frequently heard of these days.

**Jon Calvert, Riyadh, Saudi Arabia**

## Not all bad taste

The Music System is without doubt the best program I have ever used on the BBC Micro. It is well-written, well-behaved, user-friendly, well-documented, beautifully presented, stimulating, educational, and its many facets are a pleasure to explore.

Like Frank Valloton (*PCW* April, 'Letters') I find the advertisement for The Music System distasteful, but this advert is totally at variance with the style and presentation of the program itself. Fortunately, I buy from reviews, not from advertising, and all the reviews that I have read have been unequivocally enthusiastic. Had I only seen the advertisement, I should never have dreamed of buying the program.

**Margaret J Leonard, London**

## All tied up

In the daytime I am a respectable minicomputer consultant, working with high-resolution dedicated terminals. At night I am a secret home micro fan.

Until recently, I found the appalling quality of even

high-resolution colour monitors difficult to live with.

I thought I had found the solution when I discovered the wonderful CEAF Romag filter, which lifts the quality to just the right side of the pain barrier. However, the damned thing kept falling off due to the sub-standard glue used to hold on the little sticky pads.

But just today I have discovered the ideal solution, and I can now supply any users of the Romag filter suffering from this problem with unlimited quantities of Serial Television Receiver Image Enhancement Girth at the knock-down price of £1 per yard.

**Colin Walls, Bristol Business Centre, Bristol 8**  
*Is this a firm offer?*

## Pin trouble

I would like to issue a few words of warning to other readers. I have just bought a Canon PW-1080A printer to attach to my Apricot PC but found that everything I printed was double-spaced. After much headscratching, I compared the Canon interface description with that for my old Centronics printer. The answer is that the Centronics and the Apricot expect pin 14 of the interface to be ground, but the Canon (and, presumably, the similar Taxan/Kaga model) uses pin 14 as 'auto line-feed'.

When this pin is held low (ground) the printer performs a line-feed after a carriage return. The solution is simple: do not connect pin 14 of the Centronics interface of this type of intelligent printer.

This seems to be the only conflict at this time, but I'm sure there will be others in the future. What price standards?  
**Jonathan Hurwitt, Greenford**

## New version spotlight

Following the review of Spotlight (*PCW*, 'Office Practice', March), I was a little disappointed that no mention was made in the review of the extra facilities embodied in the newer 1.1 version of Spotlight (auto-dial, full AT and hi-res screen support, Kaleidoscope, and so on), although we went to great lengths to ensure that these were known about.

It is also surprising that no mention was made of the very important aspect of stability

— as far as we can ascertain, Spotlight is much more reliable in this respect, particularly when run with some of the more popular applications programs.

A factual error was made in the summary — Spotlight costs £103.48 excluding VAT, and not £125 as reported. This is also important, bearing in mind the emphasis the reviewer puts on value for money.

**RAD Sumner, Software Arts International, Ipswich, Suffolk**

*We reviewed what we had, which was version 1. Apologies for getting the price wrong — but Sidekick is still cheaper. As far as stability goes, we had no problems with any of the packages.*

## New links

We are currently looking into the possibility of setting up a scheme to offer the following facilities to disabled people in the Winchester area.

- i) A bulletin board system for the deaf, Typed messages would be passed on through the normal voice phone network by the system operator — and the deaf user would receive a reply in his mailbox. Hopefully — we would be able to reduce the normal four-five day wait for a reply to a letter to less than an hour. This would *not* be an emergency system: it would be for use in the same way as the normal phone system.
- ii) Transcription of one of our local papers into Braille, possibly using some kind of optical character recognition system.
- iii) Cheap or free access to normal computing facilities for people who, because of a disability — might not be able to leave their homes or afford to buy a computer.

We would be grateful for any help, either details of experience with similar schemes or just general technical assistance that any readers might be able to offer.

**Alan Walker, assistant secretary, Winchester Unemployed Peoples Centre, 28 Staple Gdns, Winchester**

## HP9836 Benchmarks

I read with interest in *PCW*, January the article on Benchmarks 'On your marks' and, in particular the report on the Pinnacle, whose

Benchmarks must surely be hard to surpass.

Before reading the report, I really thought I was in with a chance of providing the leader in desk top computers. I obtained the following results on a Hewlett Packard 9836 machine, which uses a Motorola 68000 processor running at 8MHz (all timings are in seconds).

BM1	0.18
BM2	0.70
BM2	1.50
BM4	1.75
BM5	1.90
BM6	3.06
BM7	4.56
BM8	16.56
Ave	3.78

Despite being displaced from the top of your table by the Pinnacle, it is worthwhile noting that the HP desk-top's Basic operates in a truly interpretive manner and has a slower MPU clock.

I believe that HP has now released a 12MHz version of the same machine, and it would be interesting to discover its Benchmark rating.

The HP9836 is, in general, used as an engineering workstation and number cruncher rather than a business machine, although I believe there are a number of standard business packages available for it.

**R Soja, Clarkston, Glasgow**

## Loading problems

The most common and frustrating fault with the Commodore 64 system is loading problems with the C2N tape deck. Users may frequently find that a tape will not load on their own system but will on another. The reason for this is that the tape deck is set up in production to accommodate a data transfer rate of 300 baud, but currently much of the software is designed to run at 1200 or even 3000 baud, and at this rate the alignment angle of the head to the tape is critical if a clear signal is to be transferred to the computer.

I have solved this problem by using the newly developed Azimuth Head Alignment Tape marketed by Interceptor Micros. The process can be done in a matter of minutes. A game on the reverse side of the tape loads at 3000 baud and gives a final accuracy check.

**Michael A Jay, Solihull, West Midlands**

**END**





**6th COMMODORE COMPUTER SHOW**  
**NOVOTEL · LONDON 7, 8 & 9 JUNE 1985**

**COME & ENJOY**  
**the most EXCITING**  
**'LONG WEEKEND' to hit**  
**computing**

The greatest event in the  
Commodore Calendar.

**Official Launch**

**Brand New**  
**COMMODORE 128**

Official launch of the brand new Commodore 128. Twice as powerful as the Commodore 64. See the 128's own whole new range of software including the standard CP/M business programme.

**COMPUTER  
GAMES  
ARCADE**

Computer games arcade for younger computer enthusiasts. Pit your skills against some of the latest and most challenging games available.

**CELEBRITY  
APPEARANCES**

**SEE THE NEW  
COMMODORE PC**

**The  
Biggest Selection  
of COMMODORE**

The biggest selection of Commodore hardware and software to be gathered in one place. Educational, Professional and games. Play the exciting new 'International Tennis' game.

**COMPETITIONS**

Competitions and treasure hunts. Fabulous prizes.

**Fun  
for all the family**

See the New Commodore PC in the special business section, and all the most recent software developments. Music Maker Orchestra to ensure a lively atmosphere.



**6th COMMODORE COMPUTER SHOW**  
**Novotel, Shortlands, Hammersmith, London W6**

Opening times: 7th & 8th June 1985 – 10am – 6pm  
9th June 1985 – 10am – 5pm.

Admission: Adults £2.00, Children (under 14) £1.





## BANKS' STATEMENT

# Ivor's dream

*Ivor Catt's vision of a quick, convenient successor to the Von Neumann method of processor control has come to fruition with the help of Sinclair. Martin Banks tells the story.*

Seven years ago I met a man called Ivor Catt, a man who was trying very hard to make a great many waves, and seemed to be creating a large number of enemies along the way.

Ivor, you see, had a dream. He had worked in and around the semiconductor industry for some time, and before that had worked with Ferranti on computer systems when computer systems really were 'clever stuff'. Ivor could genuinely remember working on machines that were the archetype; they had less power than a Sinclair ZX81 and really were as big as a house. He had seen how the computer had come to be organised along the lines established by John Von Neumann, the man who developed the first stored-program computer system.

Ivor's dream was that the so-called Von Neumann architecture, the classic way in which the processor controls all the activities of the memory, peripherals, and so on, was bunk: there were other ways of doing things, he felt. Ways that were quicker, more convenient and, given the majority of tasks that computers are used for, more logical than a centralised single processor having to 'housekeep' an entire computer system.

Like all dreamers, Ivor was laughed at. Most of the semi-conductor establishment of the day were refusing to have anything to do with him. 'After all, the world is full of crazy guys who know they have the answer' would be a suitable paraphrase of their collective views on Ivor's dream.

What Ivor needed, of course, was money. This would have shown once and for all whether his dream could be made into a working reality. He managed to get enough in the way of research grants to keep the idea alive, with small projects running at places like Middlesex Polytechnic. He kept body and soul together in those days by running a course on digital electronics, plus some consultancy work.

To the semiconductor industry in general, however, as well as the mainstream computer industry, he was something of a pariah. But that was way back when.

There was a certain wry grin on my face when the Inmos Transputer appeared, for here were some of Ivor's

ideas about the structure of computers appearing, in a different form it is true, but without Ivor.

It was with some interest I heard that Ivor had suddenly surfaced again, and not just surfaced like a piece of driftwood. He had risen meaningfully in the harbour of Sinclair Research. There, if anywhere, Ivor could find a home for outlandish ideas, a home where many such ideas have been shown to be perfectly practicable with enough applied courage.

Ivor's dream is about to see some reality as an add-on for Sinclair's QL. If it works, it could point the way to a radical change in the way we all think about computers and their peripheral systems.

I rather liked the idea of Ivor's dream the first time I heard him expound upon it. Certainly, the criticisms he had of Von Neumann's architecture made considerable sense. Imagine for just a second what this architectural structure actually involves. All actions in a computer are controlled by a single processor in a Von Neumann system. It is the processor which goes to memory and receives a program instruction; it's the processor which then goes to memory to get a byte or word of data; it's the processor which then executes the instruction; and it's the processor which then sends that processed data back to memory. Every single action is controlled and executed by the one single processor. It is a fundamental tenet of Ivor's dream that this structure is inherently slow. It can only be speeded up by increasing the speed of the processor, and there must be a finite limit to that capability.

Although such a structure is good at number-crunching applications, the majority of computers are used to performing mundane data manipulations of the 'add-this-data-to-that-record-in-the-file-named-xxx' variety. All very boring and, what is more, all involving intensive processor I/O activity. Essentially, Ivor's dream said: 'Do the processing where the data is — in memory.'

Stage one of a plan to produce such a system (that is, proving the technology) would seem to be what Sinclair is about to launch. Ivor's dream is coming alive as a 'solid-state Winchester disk', an

add-on system for the QL which will provide half a megabyte of storage which is available at an access time of under 100 microseconds. This may not appear to be a lot of data, but it will be on tap to the machine at least 100 times faster than anything that can be achieved with a real electro-mechanical system.

It has to be said that this first product will not see a full culmination of Ivor's true dream. It will be a high-speed secondary data storage system that should give the QL some respectable clout as a computer, and which could overcome the drawbacks of the often-criticised Microdrives. It will, however, utilise the technology he has propounded for so many years.

This is wafer-scale integration. Instead of cutting up the devices on a semiconductor wafer into individual chips and packaging them for sale, leave them on the wafer and, if the right combinations of chip are put together, connect them up to make a working sub-system or system. The problem with this is that the defects inherent in semiconductor manufacture mean that it would be almost impossible to get a full, working wafer. Ivor Catt found a way round that all those years ago. He called it the Content Addressable Memory, and the basic structure, which is now to be used in the Sinclair 'Winchester', is also the vehicle by which the full dream of processing in memory can be achieved.

The physical structure of the Sinclair wafer is a collection of serial registers, each with a small amount of switching logic added. The logic dynamically links these registers together in chains, finding workable registers by successively injecting test patterns into neighbours on the wafer. This means that the system is inherently fault-tolerant and can find its way round any defective wafer elements.

This technology is being used first of all to produce what is, in effect, a cheap RAM disk. It will be cheap because one wafer will be easier to produce than lots of separated memory chips. Add a bit more logic, however, and there is the basis of a pipelined processing system. Here, probably, lies the basis of Sinclair's aspirations for fifth-generation computing.

END





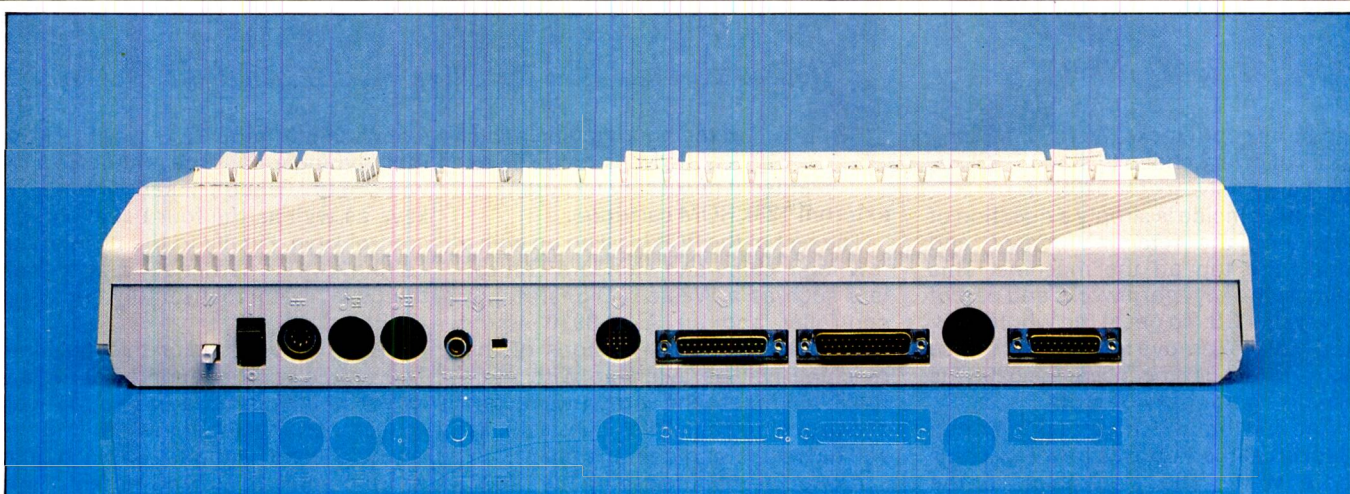


# Atari 520ST

*The Atari 520ST is based on the powerful 68000 processor with user-friendly GEM, lots of I/O facilities, large RAM and a low price tag. Peter Bright finds out if this is really the all-singing, all-dancing machine it claims to be.*







*The 520ST is well-endowed with I/O facilities — including a MIDI synthesiser port*

Maybe I'm getting old. Then again maybe the micro world is just becoming a little boring, but there are very few new micros that I get excited about any more. The last one was the Sinclair QL and look what happened to that.

At the beginning of the year I went to the CES show in the US and saw a machine worth getting excited about — the Atari 520ST. At the time the machine was announced there were two models — the 130ST and the 520ST. Both based on the ultra-powerful Motorola 68000 processor, both offering the GEM user-friendly interface in ROM lots of I/O facilities including both floppy and hard disk interfaces, and either 128k of RAM (130ST) or 512k of RAM (520ST). All this was promised at an unheard of low price level.

We have been trying to get a review machine ever since. Unfortunately even review machines are in short supply and tend to move around a great deal. Just when we thought we had one, we were told 'sorry it's gone to Hanover in Germany'. So if Mohammed won't go to the mountain...

When I arrived at the Hanover trade show I was told that Atari had decided to drop the 128k 130ST and concentrate

instead on the 512k 520ST. That was fine because that was the machine I wanted to look at anyway. So here I am sitting on the grass next to the fountains at the Hanover show typing my thoughts on the 520ST into a trusty Hewlett-Packard 110. It's a hard life!

### **Hardware**

The Atari 520ST is a surprisingly good looking beast. Jack Tramiel's previous machines haven't been renowned for their design content or overwhelming good looks. The 520ST, however, comes in a sleek mid-grey casing with matched mouse, disk drive and a range of monitors.

The keyboard takes up most of the front of the machine with ventilation slots using up the rest of the available top surface space. The design shows neat touches throughout; for example, the way the function keys are sloped to match the ventilation slots. The overall effect is very good. Apart from the keyboard and the ventilation slots the only other objects of note on the top of the unit are a small red LED power indicator and the Atari badge.

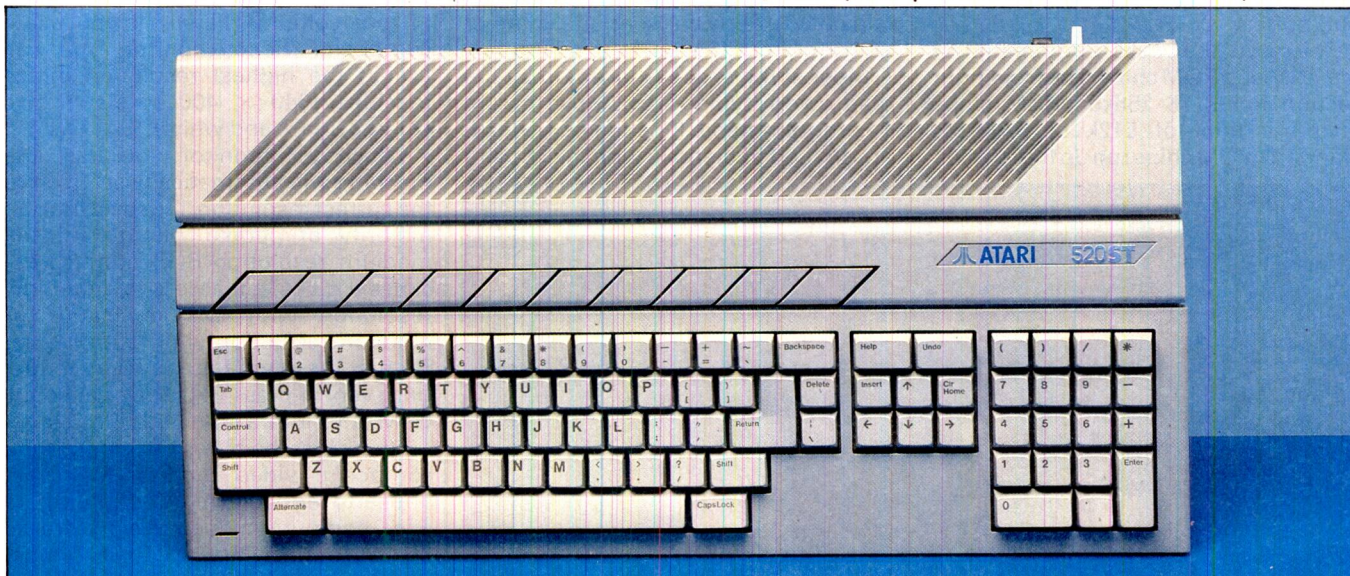
If there is one thing the 520ST is not short of, it is I/O ports. They take up the

whole of the back of the machines as well as part of each side.

The left side houses a ROM-pack expansion slot which is capable of handling up to 128k of ROM. The right side houses two joystick ports, one of which is usually used as a mouse port. The back panel houses: power-in, MIDI-in, MIDI-out, RS232 serial-port, Centronics parallel-port, TV video-out, RGB video-out, composite video-out, floppy disk port and Winchester port. That's quite a long list of I/O ports for what is, after all, a comparatively cheap machine.

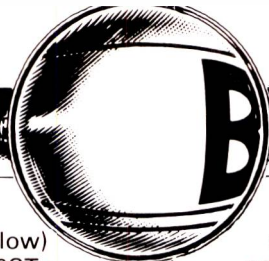
Perhaps the most interesting ports on the above list are MIDI-in and MIDI-out. MIDI is a standard interface designed to allow synthesisers and other electronic musical instruments to be hooked together so that they can communicate and control each other.

I'm surprised that the MIDI interface is comparatively rare as a standard fitment on home micros. All it requires in hardware terms is a couple of fast (31,250 bits per second) serial ports, one for input and one for output. Even if you don't want to hang a synthesiser onto your Atari, the two MIDI ports needn't be wasted. As Atari points out,



*The keyboard is well laid out and feels nice. The function keys are styled to blend with the cooling slots*





the ports could make the basis of a very cheap (if slow) local area network for 520STs.

Getting inside is simply a question of removing the retaining screws and lifting the top off the machine. This reveals the keyboard works and part of the main PCB. To get at the whole PCB, you have to remove the keyboard base plate. In fact getting inside the 520ST is very like getting inside a BBC.

The first thought that struck me when I looked at the PCB was how few chips there were. The electronics in the machine are a work of art. When you consider that it was designed and built in five months, you realise that some good people are working for Atari.

The heart of the 520ST is a Motorola 68000 running at 8MHz. I'm sure most of you are familiar with the 68000. Suffice it to say that it is one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip. It is a close relative of the processor in the QL, but where as Sinclair used a cut down 8-bit bus version of the processor, Atari has used the full 16-bit version.

Supporting the processor are no less than four custom-designed chips. All four were designed by Atari. Two of the chips are easily recognisable because they are of the new square design with pins down all four sides while the other two are contained on conventional DIL packaging.

Atari is coy about what each chip does, but as far as I can make out one of the square chips controls the RAM and some timing functions. The second square chip is called 'Glue' and does general housekeeping.

Of the other two custom chips, one acts as a video controller for the different screen modes and the other is a custom DMA controller with a high throughput 32byte FIFO (first-in-first-out) buffer.

The rest of the board is dominated by the RAM and ROM chips. The front right section holds 16 256kbit RAM chips giving a total of 512k of RAM as standard. ROM chips run up the left side

of the board giving a total of 192k of ROM. This can be expanded if necessary by adding an external 128k ROM cartridge.

The rest of the PCB is taken up with a few logic chips and standard controllers such as a Western Digital floppy controller and an AY-3-8910 sound chip. Atari says that versions of this machine will be available with more RAM, but unless the company can find cheap one megabit RAM chips, I think it will have to re-engineer the board.

As well as manufacturing the 520ST, Atari is also producing a range of peripherals for the machine. These include 3½in micro-floppy disk drives and 5¼in hard disks.

The 520ST comes with a Western Digital floppy disk controller as standard, so adding a floppy disk drive to the system is simply a question of plugging it in. Although floppy disk drives are sold as optional extras to the 520ST, you'd be pretty silly if you didn't buy one. The 520ST doesn't have a cassette port, so disks of some description are necessary if you are going to get anything useful out of the machine.

Floppy disks are available in two versions: either 500k (unformatted) or one megabyte (unformatted). They depart from Atari and Commodore traditions by using parallel connection rather than the old (and very slow) serial connection. You can daisychain a maximum of two floppy disk drives onto the system.

Hard disks are expected to be available in either 10 or 20 megabyte specifications and to connect via the hard disk interface to the DMA controller. By doing this the system achieves a maximum data transfer rate of 10 megabits per second.

Like most micros of this type, the keyboard is an integral part of the main casing of the 520ST. The keyboard is laid out in a fairly conventional manner with a total of 94 keys in four main areas.

Most of the space is taken up by the main qwerty typing area. Above this are 10 programmable function keys which are shaped to blend in with the cooling

slots behind them. To the right of the main typing area is the editing section with 'Help', 'Undo', 'Insert' and 'Clear' keys as well as the four usual cursor-control keys. Finally to the right of the editing keys is a numeric keypad with all the usual mathematical functions and an 'Enter' key.

I liked the keyboard on this machine. The unit is wide enough to allow the different functional areas to be well spaced out, making it easy to find the key you want without risking hitting spurious ones. I also liked the feel of this keyboard. It dispels the QL myth that because you have a cheap machine, the keyboard must also automatically feel cheap.

Both the keyboard and the joystick (mouse) ports are controlled by a dedicated intelligent controller chip mounted underneath the keyboard base plate. The mouse movements simply return control codes into the keyboard buffer. This means that you can mimic the mouse movements from the keyboard if you need to.

The mouse itself is a stylish looking two-button affair. It plugs into one of the joystick ports via a standard 'D' plug. In use the mouse cursor movement was very smooth with none of the jerking that you find on some mouse systems.

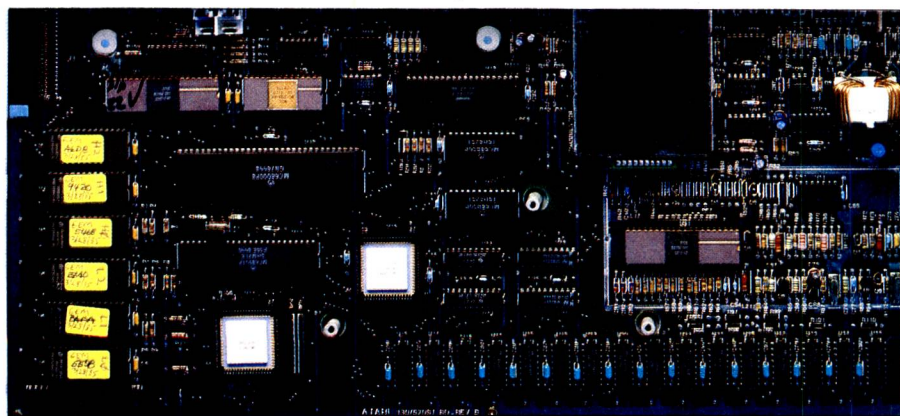
The 520ST is very well endowed with display facilities. In fact it boasts virtually every display standard going — TV modulator, RGB and composite video.

Atari has announced a wide range of monitors which are designed for use with the 520ST. Your choice of monitor governs the display resolution of the 520ST. If you use a domestic television, the resolution is 320 × 200 pixels with up to 16 colours on screen. If you use an RGB monitor, you can choose between low resolution (320 × 200 in 16 colours) or medium resolution (640 × 200 pixels in four colours). Finally if you use a composite video monitor, you can access the highest resolution of the machine (640 × 400 pixels in two colours, black and white).

Whichever monitor you use, the machine will automatically set itself to the correct resolution. I suspect that the majority of people will go for the medium resolution RGB monitor because it gives you access to either low resolution with lots of colour or medium resolution with four colours. Both of these modes allow you to produce very impressive graphics although GEM does look a little odd in lo-res.

I think that the hi-res black and white composite video monitor will only appeal to the dedicated Mac imitators and computer-aided design freaks among us. Having said that, I must admit that it was my personal favourite.

In addition to the straight RGB and composite monitors, Atari can also



*There are no less than four custom-designed chips on the main board*



# Bank of Scotland's new Home Banking Service means what it says -and more.

Bank of Scotland has a reputation for innovation, but our new Home and Office Banking Service really moves banking into the twenty-first century.

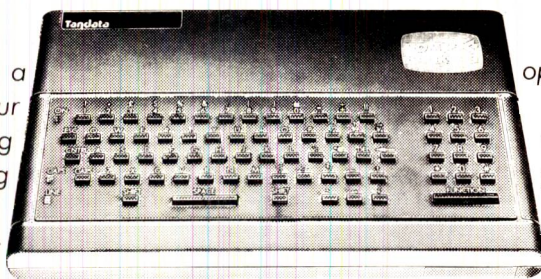
Home Banking. Managing your money through your T.V. screen in your own home. Wherever you live in Britain. Seven days a week almost round the clock.

No more queues, no more delays. Now from your own fireside you can -

- instruct payment of bills up to 30 days in advance and take full advantage of any free credit period.
- switch spare cash into your Home and Office Banking Investment Account where it will immediately earn high interest.
- keep track of your finances by seeing up to the last 3 months, or 100 transactions, on each of your accounts.
- order cheque-books and statements.

Remember a Bank of Scotland personal Current Account carries no charges provided it is not overdrawn (to cover the clerical costs of setting-up and maintaining Standing Order records, an operating charge of 10p will be added to each Standing Order payment as it is made).

All this and more at your fingertips. Simple to



operate, yet absolutely secure.

What's more, since the viewdata system is **Prestel\*** you also have access to any of their other information systems, covering over 800 topics. As a bonus we are offering at a

special price an adaptor which connects your T.V. and telephone into the system.

Interested? FREEPOST the coupon below and we'll send you complete details.

Banking will never be the same again.

**HOME**  
**BANKING**

\*Prestel is a registered trade mark of British Telecommunications PLC.

Post to: Home Banking Centre, Bank of Scotland, FREEPOST, Edinburgh, EH1 0AA.

I would like to know all about Home Banking from Bank of Scotland.

Please send me your information pack.

NAME

ADDRESS

POSTCODE



**BANK OF SCOTLAND**  
A FRIEND FOR LIFE

PCW/6/85

**On Prestel Financial Services.**



supply a natty little monitor with built-in disk drive. This makes the 520ST system into a very neat desktop package.

## System Software

The system software in the Atari 520ST works at two levels. On the top is a friendly Mac-like front and underneath is a fairly standard disk-operating system.

Both the front end and the disk operating system are supplied by Digital Research (DR). In fact Atari has licensed the entire range of DR's products ranging from operating systems through utilities to all its languages. So we can expect any advances by DR to be reflected in Atari products. Unlike most other disk-based machines both the DOS and the front end are contained in ROM. This allows the machine to go directly into its operating system on start-up without having to read from disk.

Although it is unlikely that the average user will ever want to descend into the DOS, I think it is a good idea to look at the front end and the DOS separately. The disk operating system on the Atari 520ST has been rather unfortunately named 'TOS'. This apparently stands for 'Tramiel Operating System' although I fail to see why anyone would want to operate a Tramiel.

Although its name is unlike any other operating system, TOS is actually based on Digital Research's CP/M-68k. This is a little-known and not very popular version of CP/M for the Motorola 68000 processor. The main difference between TOS and CP/M-68k lies in the area of file handling. TOS has a hierarchical file structure à la MS-DOS whereas standard CP/M-68k does not.

The command language of TOS is a strange hotch potch of CP/M, MS-DOS and Unix-like commands. When you enter the system level you are greeted by a version of the familiar CP/M-DOS-style 'A' prompt. However, unlike CP/M you can enter path-names, play around with sub-directories, and the like.

Most of the old unfriendly CP/M commands are there with the addition of a few commands of uncertain parentage. You can type 'DIR' and get a directory, or you can type the Unix equivalent 'LS' to get the same result.

But as I said earlier, it is unlikely that anyone other than software developers will want or need the command-line functions of TOS. For most people the friendly front end will be the face of the 520ST.

Because it has licensed Digital Research's entire range of software, it was logical for Atari to use DR's GEM friendly front end for the 520ST. I have written quite a bit in past issues about GEM (see *PCW*, February 1985), so I'll just do a quick re-cap of the most

interesting features here. GEM stands for Graphics Environment Manager. It allows companies who use it to give their machines a user-friendly graphics interface which closely resembles that of the Macintosh.

This similarity extends to the use of movable re-sizable windows, ikons to represent objects such as disks and disk files, and the use of pull-down menus and mice. The GEM environment makes it much easier for the novice to do all the usual housekeeping chores as well as making it easier to call up programs from disk.

In addition to making life as easy as possible for the user, GEM also makes life comparatively easy for the applications programmer who wants to move his program from machine-to-machine. To understand this we need to look at how GEM works.

One of the functions of GEM is to provide a standardised interface to the graphics screen and graphics devices in much the same way as a disk operating system provides a standardised interface to the disks.

By using GEM, a programmer can write to this 'Virtual Device Interface' rather than having to go directly to the hardware of the specific machine he is writing for. This makes it much easier for the programmer to move his masterpiece to other machines which use the GEM environment.

Originally, Digital Research demonstrated GEM on the IBM PC, but it also works on compatibles and machines like ACT's Apricot range and the Atari.

GEM Desktop on the Atari looks very similar to GEM on most other machines. You have the disk ikons and trash can at the right of the screen, a menu bar along the top, and windows can be opened, closed and moved in the same way as on other GEM machines. However, as you would expect, because of its fast 68000 processor, GEM moves along with much more of a clip on the 520ST than it does on something like an IBM PC or an Apricot which can sometimes be quite slow — especially when updating more than one window at a time.

Atari has added a couple of desk accessories into the 'Desk' pull-down menu. These included a Macintosh-style 'Control Panel' which allows you to play around with some of the system settings such as the colours used to display the GEM Desktop. Atari has also included a simple terminal emulator and a utility to set up the RS232 serial port.

One of the nice features of GEM is that it adapts itself to the different specifications of the hardware it is running on. Consequently, as you would expect, there is quite a difference between the way it looks in the hi-res black and white mode to the lo-res colour modes.

Personally I liked the hi-res mode more than the colourful lo-res modes. Other people seem to prefer the colourful modes. In its hi-res black and white mode, GEM makes the 520ST look more like the Macintosh than any other GEM machine I have seen.

One nice feature of GEM on the 520ST is that it allows you to have two logical disk ikons operative, even if you only have one physical disk drive attached to the system. GEM treats them as separate disks and allows you to do all the things you would do on a twin-drive system by prompting you to change disks in the drive when necessary. I found this was extremely useful, especially when I was trying to copy disks.

Overall, the implementation of GEM on the Atari is very good. Having GEM in ROM makes the loading process much faster than the tedious rigmarole you have to go through to get it to load on something like the IBM PC. It also means that if the system bombs out for any reason, it goes to GEM as the base routine rather than some obscure monitor or suchlike.

Although the Atari implementation is good, what you can do with the GEM Desktop is still limited to some extent by the operating system underneath GEM.

## Applications software

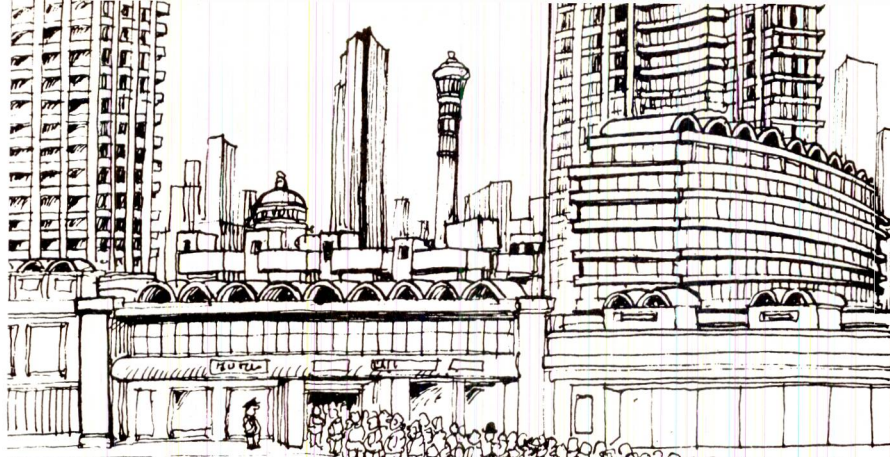
When the 520ST goes on sale, it will be supplied with GEM, Basic and Logo. At the time of writing there still seems to be some debate within Atari as to whether these will all be in the internal ROM or whether parts will be on disk. It seems likely that early machines will have software on disk for debugging purposes and later machines will have the software in ROM.

Both of the programming languages are again supplied by Digital Research. The Basic is its Personal Basic and the Logo is its DR Logo. Both of these products are widely available on other machines, although they have been modified somewhat for the Atari machine.

In its usual form, Personal Basic is functionally very similar to standard Microsoft Basic. At the time of writing the Atari modifications were far from finished. The most obvious difference between the standard version and the Atari version is that the user interface has been changed. Whereas before you had a simple command line, there are now pull-down control menus, mouse control, and different windows for editing output and so on.

Eventually your Basic programs should be able to control the whole GEM user interface. So you should be able to write mouse-driven high resolution colour programs with lots of windows, bells and whistles. However, at the time of writing the only way to do this was by using loads of PEEKs,





Barbican Centre,  
London EC2.  
25th-28th July 1985

# THE THIRD • OFFICIAL • ACORN USER EXHIBITION •

## STILL THE BIGGEST! STILL THE BEST!

Four days of non-stop entertainment and business.

If you're an Acorn owner, user or just thinking of buying a computer you shouldn't miss the Acorn User Exhibition. It's four days of fun, bargains, demonstrations and information.

There are specialist areas for business, education, telecommunications, robotics and home use. Each with special demonstrations, competitions, and brand new products. And there'll be experts to answer your technical questions.

All in all, we're expecting over 120 different companies to be there, as well as Acorn themselves.

And because the Exhibition is at the Barbican there's plenty of restaurants bars and rest areas.

So if you're a businessman, scientist, parent, teacher, computer fanatic or home user. **Don't miss the only OFFICIAL ACORN EXHIBITION.**

For information on stand availability ring  
Tim Collins on 01-930 1612

**P.S. Acorn have promised  
some very special events  
exclusive to the  
show!**

REDUCED  
PRICES  
FOR GROUPS

Entry only £1 per person  
for bookings over  
10 people. Complete form below.

**MISS THE QUEUES - SAVE MONEY!**

Use the coupon below to save money and miss the queues.  
Entrance at the door will be £3 for adults, £2 for under sixteens.

### HOW TO GET THERE

By train: Holborn Viaduct, Cannon Street, Broad Street,  
Kings Cross, St Pancras, Liverpool Street.

By Underground: Moorgate, Barbican, St Pauls, Bank,  
Liverpool St.

Computer Marketplace (Exhibitions) Ltd  
(A Rushworth Dales Group Company)  
20, Orange Street, London WC2H 7ED.

NEWS FLASH  
TRY OUT THE  
ENHANCED BBC MICRO  
PLAY 'REVS' THE  
MOTOR RACING GAME  
ELITE II (6502)  
SPECIAL ARCADE WITH PRIZES

To: Computer Marketplace (Exhibitions) Ltd, 20 Orange St, London WC2H 7ED.

Please send \_\_\_\_\_ (Qty) Adult Tickets at £2 and  
\_\_\_\_\_ (Qty) Under sixteen tickets at £1 each

I enclose cheque/P.O. for £ \_\_\_\_\_ or debit my Access/Amex/  
Diners/Visa card no. \_\_\_\_\_

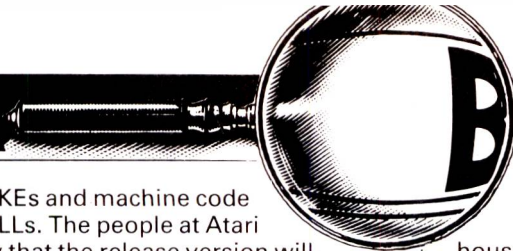
Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_





# BENCHTEST

POKEs and machine code CALLs. The people at Atari say that the release version will have extra keywords to control all these features. While I'm happy to believe them, remember that Jack Tramiel's last machine was the Commodore 64! Enough said.

The Atari version of DR Logo was in much better shape. DR Logo is a popular version of the language for CP/M and MS-DOS machines. Like the Basic, the user interface of DR Logo has been changed to take advantage of the user friendly GEM interface.

In the case of Logo there are different windows for commands, editing, output, and so on, with many options being available from the pull-down menu bar. So you can watch the turtle rushing around in one window while the debugger works through your program in another. Very pretty.

For the serious software developer, the most popular language is likely to be C. Most of GEM is written in C and Digital Research provides a full set of C bindings to GEM to make applications easier to develop.

A number of software developers seem to be taking advantage of GEM's Virtual Device Interface and developing software on IBM PCs and then downloading and re-compiling it on the Atari.

As far as finished applications packages are concerned, Atari says that it

has sold over 100 development systems to US software houses and that they are beavering away converting their packages.

Only time will tell if this is true, but the Atari software guy did have a lot of interesting looking discs in his bag at Hanover.

## Future products

Atari in general (and Tramiel in particular) seems adamant that the 520ST is just the start of a range of future enhanced machines. The most likely enhancement is more memory (although 512k seems enough for most purposes!) and the introduction of a local area network of some description.

Perhaps the most interesting new product however, is the addition of a CD ROM unit. We ran an article on CD ROMs a couple of months ago (see *PCW*, April 1985). They use the same kind of optical-digital compact disks as the home hi-fi systems except that the computer versions don't need the complex digital-to-analogue converters as in the audio units. Instead of carrying digitised audio signals, computer compact disks store digital computer data.

The main differences between compact disks and magnetic disks is that whereas you can get about 720k on a double-sided magnetic disk, you can get 550 megabytes of data on one

compact disk. The trouble is that whereas you can write to a magnetic disk, you can only read from a laser disk — hence the name CD ROM.

Atari plans to launch its CD reader for around \$500 which is about half the price everyone else is charging. Its first piece of CD software will be a fully indexed (right-down-to-word-level!) multi-volume encyclopaedia on a single compact disk. This should get into the shops later this year.

## Documentation

As this was a pre-production machine no documentation was available.

## Prices

The 520ST with single 500k disk drive will sell for £699.99. Prices of the other peripherals in the range were still being discussed as we went to press.

## Conclusion

There can be no doubt that the Atari 520ST is a very impressive machine.

From the technical viewpoint the machine seems to have everything going for it — good keyboard, lots of I/O facilities, lots of RAM and what, for many, is the nicest 16-bit processor around.

When you add in the GEM friendly user interface and the availability of cheap disk drives, you end up with a very impressive system indeed. I'm still not sure whether to classify it as a home or business machine. Its abilities are well suited to both. I have a feeling that in the US it will be treated more as a home machine and over here it will appeal to business users.

Having said that, it is a good machine, there are still two areas that you should think about before you rush off to your local Atari dealer to part with your hard earned cash.

The first is the availability of good applications software. It's a virtual certainty that Digital Research's word-processing and graphics applications programs will be available soon, as will Atari's Infinity integrated package. But I'm not so sure if or when third party applications will begin to appear. Remember, it took the best part of a year for applications to start appearing on the QL.

The second point to watch is the price of the system. The original 130ST was set to sell in the US for \$399. This set people thinking that the range is cheap. While this is still true when you consider what you get, remember that the 130ST has been dropped and you are looking at about £700 for a 520ST and disk drive. When you add a monitor and other bits and pieces, you won't see much change out of £1000.

Even so, the bottom line is that when the machine appears in the shops, I'll be at the front of the queue to buy one. **END**

## Technical specifications

Processor:	Motorola 68000 running at 8MHz
ROM:	192k containing O/S and GEM
RAM:	512k
Mass Storage:	500k or one megabyte (unformatted) 3 1/2 in micro-floppy disks, choice of hard disk capacities.
Keyboard:	94 keys including 10 function keys.
I/O:	RS232 serial, Centronics parallel, floppy disk, Winchester, TV video, RGB video, composite video, MIDI-in, MIDI-out, joystick, mouse, ROM cartridge
DOS:	TOS, GEM
Bundled software:	Personal Basic, DR Logo

## In perspective

By the time you've got a 520ST, disk drive, monitor and so on, you are looking at a system that is just about below the magic £1000 price barrier. This puts the 520ST into competition with machines such as the Sinclair QL and the ACT Apricot F1 (or the even cheaper 'e' version).

As far as technical specification goes, the 520ST is far ahead of both these machines — it's got a better processor, more RAM and a friendlier user interface than either of them.

However, things get much closer when you look at the way these machines compare in terms of usability. This is especially true of the Apricot F1. Where the 520ST has a faster processor and more RAM, the Apricot F1 has access to a far wider range of applications programs. Both machines run (or are capable of running) GEM. The Apricot F1 has a 3 1/2 in disk drive built-in — the 520ST offers a cheap external 3 1/2 in drive. The more I think about it the more functionally similar the 520ST and Apricot F1 become.

The Atari 520ST is extremely competitive in the sub £1000 market. In terms of technical merit it is far ahead of the field. In terms of usability for the money, it beats the QL but the Apricot F1 comes very close.



# **CADO SYSTEM 16.**

## **FOR BUSINESSES WITH MORE AMBITION THAN BUDGET.**

When your plans seem to overtake your capital, then Cado System 16 is the computer system for you.

It lets you expand when you can afford to without having to compromise on the equipment you start with.

From its small compact beginnings (it can fit under a desk), System 16 can be expanded up to 16 workstations, multitasking from a comprehensive catalogue of software packages, including: word processing, database, mailing, and a range of specific business software such as Purchase and Nominal Ledger, Stocks, Costing, Sales and Order Processing.

With your future in mind, System 16 gives all software packages access to the main database, with separate password protection for individual databanks should you wish to set up sub-companies.

Response is very fast. System 16's revolutionary design gives you an answer to your enquiry in only a fraction of a second - faster than any

of the competition.

Naturally, Cado System 16 has the advanced CCS Business Systems back up. That means complete systems design, software support, peripherals, technical back up and maintenance, co-ordinated from three regional offices in London, Birmingham and Bristol.

In fact, System 16 is endorsed with everything you'd expect from the \$2 Billion strong Contel-Cado Corporation.

Which should be reassuring, no matter what size your company is now.

Contact your local office for a demonstration or post the coupon now for more information.



To: Tony Cook, Sales Director, CCS Business Systems,  
Vulcan House, 163 High Street, Yiewsley, West Drayton,  
Middlesex UB7 7QN. Please send me more information about  
CADO System 16. PCW6 85

NAME \_\_\_\_\_

POSITION \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

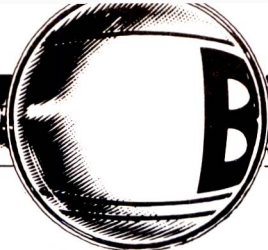
TEL: \_\_\_\_\_

# **CONTEL CADO CCS**

**BUSINESS SYSTEMS**

CCS Business Systems, Vulcan House, 163 High Street, Yiewsley, West Drayton, Middlesex UB7 7QN. Tel: 0895 445757. Telex: 8814207.  
BIRMINGHAM, 25-27 Smallbrook, Queensway, Birmingham B5 4HP. Tel: 021-632 5343. Telex: 337619.  
BRISTOL, 1 Denmark Avenue, Bristol BS1 5HD. Tel: 0272 290245. Telex: 44363.



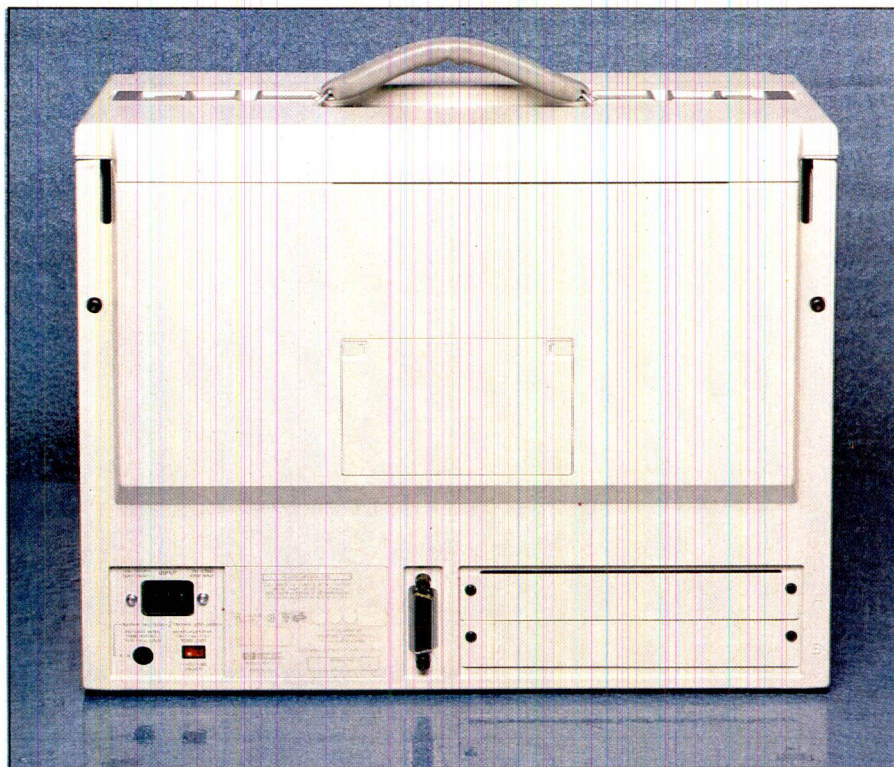


# Hewlett-Packard Integral PC

*Hewlett-Packard has attempted to build the ultimate portable — minicomputer specification and power in a compact, modern design. Nick Walker takes a look at the single-user, Unix-based Integral PC.*







*The Integral PC is encased in extremely durable hard, grey plastic*

The Hewlett-Packard (HP) Integral Personal Computer has a specification that reads like a list of state-of-the-art micro-computer technology: 68000 processor with electroluminescent display; Think-Jet printer; 3½in micro-floppy disk drive; and the Unix operating system.

I expected a large multi-user system with the traditional hefty Hewlett-Packard price tag. In fact, the machine is single-user and contained in one 25lb transportable box — the only thing I was right about was the price.

## Hardware

At 25lbs and with physical dimensions similar to that of a sewing machine, the Integral is most definitely in the luggable category. It is smaller than other luggables, such as the Osborne, and fits comfortably on overhead shelves or under aircraft seats. When packed away the machine is encased in hard, grey plastic capable of taking the bumps and knocks of life on the road. HP went to some length to ensure the machine's durability, including dropping it from over three feet onto a solid floor.

To open the unit, slide two metal catches on the top outwards; the lid then slides back to reveal the printer. The keyboard detaches from the side, exposing the screen. You then plug in the keyboard at the front, mains power at the back and switch on. The first thing that strikes you is that the machine looks odd compared to other luggables. Due to the screen being so thin, the Integral can remain in its standing position (unlike other luggables that are tilted onto their side) so that it takes up considerably less desk space.

The Integral PC is based on a 16/32bit 68000 micro-processor running at 8MHz, supplemented with a 16-bit custom graphics processor. Standard RAM is 512k made up of 256k by 1-bit DRAM chips with no parity chips. This is expandable to 1.5Mbytes internally, or 5Mbytes by means of an expansion card on one of the expansion ports. An extra 32k of RAM is reserved for the display and graphics processor, and hence is not seen by the user. The ROM is a massive 256k containing the Unix operating system, a window manager and a user-friendly interface.

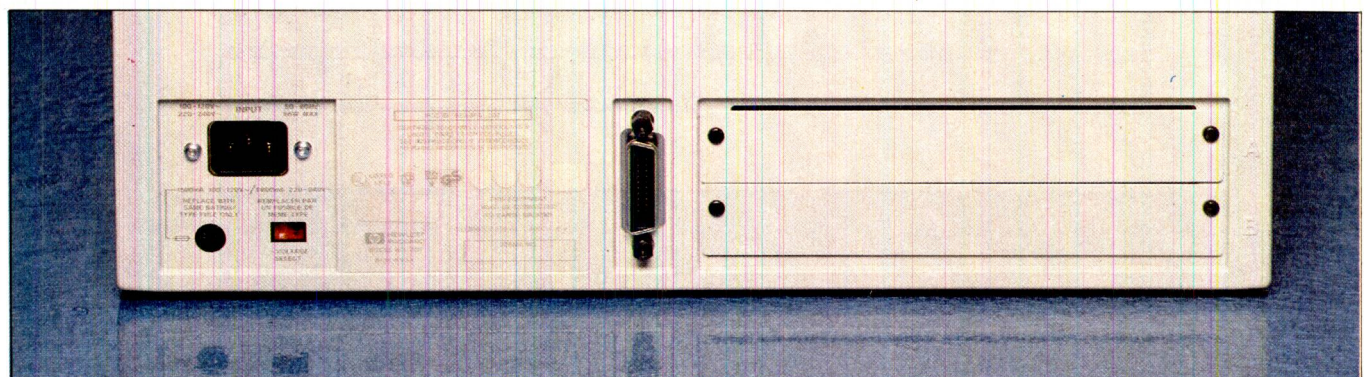
Within the case is an almost silent fan. HP claims that the Integral will work in extreme conditions (that is 40 degrees C and 80 per cent humidity).

The real centrepiece of this machine is the electroluminescent display, which is as slim as an LCD but much clearer, faster and quite readable in direct sunlight. Such displays are not common as they are still an emerging technology and hence expensive, and, more importantly for portable manufacturers, really require mains power.

The Integral can display a full-size 24 lines by 80 columns on its amber-only display. The screen itself measures 8 ins by 4 ins (twice the size of the Grid Compass display — the only other machine with the same screen technology) and when used graphically with its 512×255 bit-mapped pixels gives very high resolution. A number of fonts are provided for character displays, as well as a font editor to create your own. The viewing angle is adjusted by pulling the bottom of the display.

Only one true interface is available on the back of the machine, the (Hewlett-Packard) standard IEEE-488 HP-IB interface bus. To this can be added standard HP peripherals such as plotters or other HP printers. In addition, this port is designed to accept a wide range of instrument controllers as used on HP scientific computers. A bus expander is available to hook up more instruments and peripherals. Further I/O capabilities such as RS232 communication are available with the purchase of an additional I/O board which plugs into one of the two expansion ports (also used for adding external memory). The two small British Telecom-style jack plugs on the front of the machine conform to HP's protocol for human input devices HP-HIL (Hewlett-Packard Human Interface Loop); the keyboard plugs into one, leaving the other free for mouse, touch tablet or any other HP-HIL device.

The low-profile detachable keyboard is a full-size qwerty device with 90 keys including numeric keypad, eight function keys and numerous control keys. It has a good feel and a tilt mechanism at the rear to bring it to the right angle. The numeric keypad also has special functions which are accessed via the SHIFT key, such as delete line and insert character, and at its base are the cursor



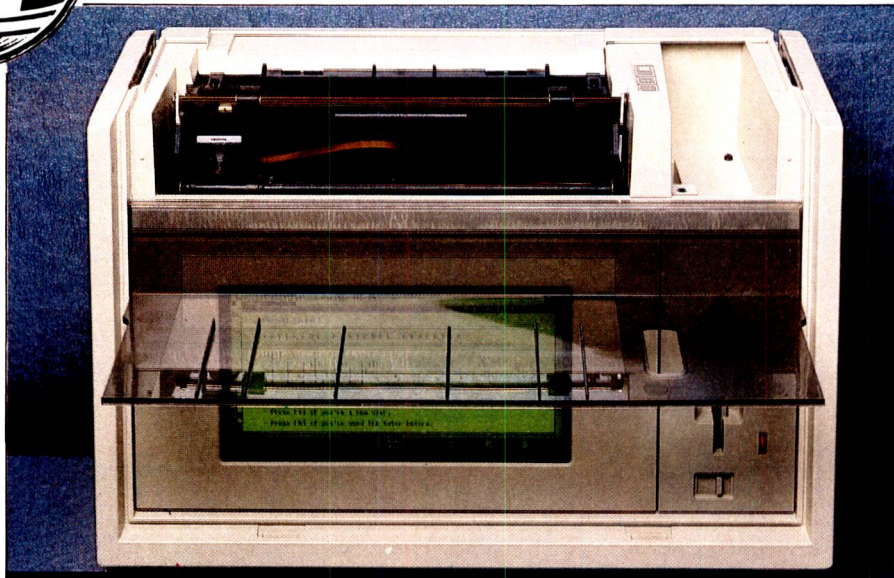
*The back of the machine supports just one true interface — the standard IEEE-488 HP-IB bus*



control keys. The integral also has a SELECT key, used to select the active window for human interaction; an EXTENDED key for special characters; a PRINT key to dump any screen to the printer. The RESET/BREAK and STOP keys are in the top left-hand corner out of harm's way. The keyboard is completely soft-mappable, with the current definition of the function keys shown on the bottom lines of the display.

Probably the biggest disappointment on a machine of this price is that HP has only included one disk drive. This is a 3½ micro-floppy drive to the right of the screen with disks inserted at 90 degrees to the normal. Although the lack of a second drive was somewhat compensated for by the OS being entirely in ROM and the ability to define half of the available RAM as a RAM disk, I still missed a second drive. If the RAM was expanded to 1.5Mbytes and a reasonable amount was set aside for a RAM disk, the loss wouldn't be as bad. The Integral takes hard-sectored, double-sided, double-density disks with a total storage capacity of 710k per disk. You can have more mass storage externally right up to a 55Mbyte hard disk drive.

The Integral has a built-in HP Think-Jet printer which uses a sack of ink



*Inside: The Think-Jet printer and electroluminescent display*

squirted onto the paper in a controlled manner. HP also sells this printer as a peripheral with a Centronics interface to hook on to an IBM PC, BBC or any other machine with a Centronics port. Before using the printer for the first time, you have to insert an ink sack complete with a strategically placed piece of blotting paper to catch the initial spurt of ink when the machine is

switched on. The cartridge contains enough ink for 500 pages of text and the entire print head mechanism (a solid-state column of 12 individual squirters), so when you change the cartridge you also insert a new print head.

Although the printer will work with almost any paper, the mechanism is actually shooting droplets of ink at the paper, so very absorbent paper suffers

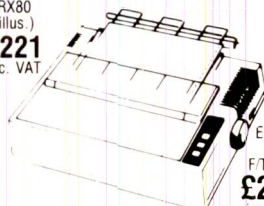


*The low-profile detachable qwerty keyboard has 90 keys, a good feel and a tilt mechanism*



## DOT MATRIX

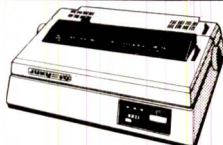
EPSON  
RX80  
(illus.)  
**£221**  
inc. VAT



EPSON  
RX80  
F/T Plus  
**£255**  
inc. VAT

Epson RX80	£192.17 + VAT	= £221
Epson RX80 F/T Plus	£221.74 + VAT	= £255
Epson FX80	£329.57 + VAT	= £379
Epson FX100 (132 col. width)	£511.30 + VAT	= £588
NDC FT5001 (Epson Compatible)	£164.35 + VAT	= £189
Kaga Taxan 810 (NLQ)	£277.39 + VAT	= £319
Kaga Taxan 910 (NLQ 132 col.)	£346.96 + VAT	= £399
RS232 Interfaces from	£27.83 + VAT	= £32
Printer cables (2 metres)	£13.04 + VAT	= £15

## DAISYWHEEL



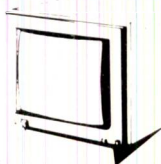
Brother HR 15	£323.48 + VAT	= £372
Juki 6100	£329.57 + VAT	= £379
Daisystep 2000	£230.43 + VAT	= £265
Uchida DWX-305	£226.09 + VAT	= £260

## PROCESSORS

BBC Model B	POA	
BBC B with DFS	POA	
Amstrad CPC464	£157.39 + VAT	= £181
Acorn Z80 Ext. Processor	£338.00 + VAT	= £389
Apricot F1 Plus Mono Monitor		
Plus Software pack	£1126.00 + VAT	= £1295
Apricot PC Twin 315K disks	£1300 + VAT	= £1495
Apricot PC Twin 720K disks	£1465 + VAT	= £1685
DEC 11/23 + 40MB	£6086.96 + VAT	= £7000
DEC 11/73 + 170MB	£10434.78 + VAT	= £12000
Opus disk drives from	£86.09 + VAT	= £99
WS2000 modem inc. cable	£129.57 + VAT	= £149

PHONE FOR OUR QUOTATION ON BESPOKE ACCOUNTING  
SOFTWARE INVOICING/LEDGERS/PAYROLL

## colour MONITORS



MICROVITEC  
1451 QL  
Medium Res  
**£265**  
inc. VAT

Amstrad CTM640	£146.96 + VAT	= £169
Microvitec 1451 QL	£230.43 + VAT	= £265
Microvitec 1451 BBC	£242.61 + VAT	= £279
1451 RGB/PAL/AUDIO	£291.30 + VAT	= £335
Microvitec 1441	£433.91 + VAT	= £499
(High Res. BBC)		
Taxan Kaga Vision III	£326.09 + VAT	= £375
(BBC/APPLE/IBM)		

## mono MONITORS

Sanyo DMS112 ex (18MHz)	£88.69 + VAT	= £102
Zenith 12" (15MHz Green)	£66.96 + VAT	= £77
Zenith 12" (15MHz Amber)	£77.39 + VAT	= £89
ISL 20 Swivel 80 col.	£68.70 + VAT	= £79
(20MHz tilt + swivel base)		

## micro FAST

The Experts

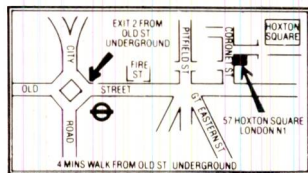
57 Hoxton Square London N1

**01-729 1778**

Prices are correct at time of  
going to press  
Access and Visa welcome  
Open Mon - Sat 9am to 6pm

MAIL ORDER:

Carriage: Printers and Monitors £10  
Phone Orders welcome



# BIG DISCOUNTS

## IBM P.C. COMPATIBLE FERRANTI ADVANCE 86B

256K TRUE 16 BIT

INCLUDING 2 X 360K DRIVES

MACHINE **£1,099.95** PLUS VAT.

## (GREEN SCREEN)

8 HOUR CALL OUT.

12 MONTHS GUARANTEE

Main Dealer in Ferranti Computer Systems

Also Call for Big Discounts on the Following:

COMPUTERS	PRICE	PRINTERS	PRICE
Epson PX8 Portable	Call	Anadex DP-9725B Colour	Call
Epson QX10 Desk Top	Call	Anadex DP-6500B 500 Cps	Call
Zenith Desk Top 10mb	Call	Epson JX-80 (Colour) 160 Cps	Call
H/Disk - 1	Call	Epson FX-80160 Cps	Call
All Ferranti Models	Call	Okidata RS 232 160 Cps	Call
PRINTERS		Okidata RS 232 200 Cps	Call
Anadex DP-9001B 150 Cps	Call	Okidata RS 232 350 Cps	Call
Anadex DP-9620B 240 Cps	Call	Okidata Parallel 350 Cps	Call

CALL US FOR BIG DISCOUNTS ON FERRANTI COMPUTER SYSTEMS.  
MANY ITEMS NOT LISTED GIVE US A RING FOR ALL YOUR COMPUTER  
HARDWARE NEEDS.

Also for Software at a Discount

Wordstar D Base 2 & 3 etc. Call Call Call

## Discount Computer Centre

478/480 WALSALL ROAD, GREAT WYRLEY

WALSALL, WEST MIDLANDS

PHONE US NOW FOR OUR LATEST PRICES

**0922 418900**

# Adelphi Business Computers Ltd.

- Full support
- Competitive prices
- Nationwide delivery & installation service

*Specialists in*

- Networking
- CAD/CAM (Robocom & Autocad CAD systems supplied)
- Tailored systems



Authorised  
Dealer



Apple Computer



**FORTUNE 32:16**

Don't delay — Telephone Coventry (0203) 553944

We try harder





from some fuzziness. HP supplies its own paper that works excellently. Two things about the paper loading annoyed me: firstly, a pile of paper behind the machine substantially increases the desk area used; and secondly, there is no platen knob so care is needed with the line-feed button.

In operation I was impressed by how quiet the printer was: there are no print head pins hitting the paper. It is also fast and flexible, printing at up to 150 characters a second in four different pitches. Graphics printing is supported, and any screen dumped will be printed accurately. The print quality falls between that of dot-matrix and daisy-wheel, and is certainly good enough for general letter-writing.

Electrical paths lead from each squirter to the front of the ink sack, where they meet with contacts on the carriage assembly. When the contact is activated, a small squirt of ink is projected from the ink sack to the paper.

The Think-Jet's four pitches are: normal 12 characters per inch (cpi) giving 80 characters per line; expanded six cpi giving 40 characters per line; compressed 21.3 cpi giving 142 characters per line; and 10.7 cpi giving 71 characters per line.

Each of these modes can be bold, underlined or both. Unlike dot-matrix printers that take multiple passes of the print head to print bold or underlined, the Think-Jet can do it in one, keeping its 150 characters per second print speed. You can also set the line spacing and the number of lines of text on each page.

A number of optional peripherals are available for the system including hard disks, laser printers, and plotters. The only optional peripheral with the review machine was the mouse, which I consider absolutely essential in order to use the windows and user-friendly interface. HP's mouse must rate as one of the most elegant designs with a circular hand grip and twin buttons. The only problem with the mouse is that the BT socket is to the left of the machine; for right-handed use, a cable stretches across the keyboard.

## System software

Two levels of system software are supplied with the Integral — the underlying Unix environment and, on top of this, HP's own user-friendly Personal Application Manager (PAM). Formatting the output from these and other applications is a program called HP Windows. All three are all in ROM, including Unix.

The Unix supplied is an AT&T Bell Laboratories System III-compatible version called HP-UX 2.1, which is referred to in HP's literature as a 'vanilla' Unix environment. While the

multi-user features of Unix are obviously lost on this machine, the multi-tasking features are not.

It is quite possible to be printing from one application while monitoring an instrument and updating a spreadsheet. I found no limit to the number of applications you can have running at one time, although the machine gets noticeably slower after about five or six. Even given all this, Unix does seem to be a case of overkill in a single-user micro. There is no way you can directly interact with the Unix ROM; to enter Unix commands, you need to run the HP-UX commands disk which gives you 32 standard Unix commands including

*'From the nature of the manuals and software developed, it is obvious that HP also sees the machine selling to business and first-time users.'*

the Berkley enhancement 'csh', a Unix C Shell.

There are three other system software disks included: a utilities disk for performing standard system functions and system customisation; a diagnostic disk that tests all system components and reports any faults; and a system programming disk with the HP graphics language (HPGL), window and serial port drivers, and real-time extensions.

For users who use a mainframe system, the Integral can act as an intelligent terminal. You could then write source code on the mainframe, and download to the Integral to compile and run or *vice versa*. The Unix on the Integral is very flexible, as it can dynamically update itself through a RAM jump table. This gives the ability to emulate Xenix, System V and other Unix derivatives.

As a single user, it is rare that you will

need to deal with Unix directly. All file manipulation and applications-running can be done from the Personal Application Manager (PAM), which is fundamentally the same front-end as found on the HP-150 but with some additions to incorporate the multi-tasking nature of the Integral and the operation within the window manager. The most significant advantage of PAM on the Integral over the HP is that all the software is in ROM, making it much faster and less cumbersome to use.

Upon the machine being switched on, PAM reads the disk drive, looks for installed applications and displays the names onscreen. The PAM window is divided into two sections. The upper portion, the command area, is where you issue commands and receive feedback from PAM. The lower portion, the folder area, displays the name of applications and data files. At the bottom of the screen is a user menu containing eight frequently-used file operations. Further system commands such as FORMAT are available on the system disk as PAM applications.

To run an application, you highlight the application name by mouse or by using the keyboard, and hit the function key corresponding to start (f1), again using either the mouse or the keyboard. A full description of PAM was featured in PCW's review of the HP-150 (May 1984), so I'll just concentrate on those features specific to the Integral.

PAM on the Integral supports pipelining: that is, two or more programs can be connected, whereby the output from one acts as the input to another while running concurrently. This means you could have program A obtaining data from the user, which would be passed via the first pipe to program B where it would be checked for validity. The validated data could then be passed by the second pipe to program C for formatting into a report. This would be specified to PAM as: program-A / program-B / program-C.

Similarly, there are times when it is necessary to specify purely sequential processing, such as making a back-up of a disk. A program can be set to run by itself only by adding a semicolon to the end of the program name: that is, backup 1;.

Also in ROM is HP Windows; a window, graphics, mouse and function key interface. Although not of the same quality as that of the Macintosh, Windows does provide a natural environment for multi-tasking. Windows allows you to place, stretch, hide and shuffle multiple windows, and is much easier to use when operating with a mouse. The top window is the only one with which you can interface directly. Each window is in fact treated as a separate 9600 baud terminal with 80 columns and 20 lines, and uses the

## Benchmarks Hewlett Packard Integral PC

BM1	1.9
BM2	3.5
BM3	6.9
BM4	7.1
BM5	8.8
BM6	18.3
BM7	27.3
BM8	21.9
Ave	11.9

**All timings in seconds. For a full listing of the Benchmark programs, see page 185, January issue. Machine loaned by Proteck.**



# NOW an expansion system as versatile as the QL

**NOW AVAILABLE FOR  
IMMEDIATE  
DELIVERY**

## All in one - one system, one cartridge

MEDIC takes up where others leave off. Why narrow down your choices? The Q.L. was intended as a versatile computer capable of fulfilling many roles. With our system cartridge, the choice is yours. As well as a disc interface including parallel port you can have any one of the following: memory upto 512K, modem, Eprom card (192K) experimental card including front interface. You can upgrade to any level in line with your needs. Our disc interface affords full Psion, versions 1 and 2, compatibility.

**Ask your dealer for details or order direct:**

**medic datasystems limited**

76 Grainger Close, Basingstoke, Hants. RG22 4EA  
Telephone: 0256 460748

☐ Please send me further details on your products.

I wish to order the following: (please tick required items)

### Individual Products

- ☐ 64K Memory £99.95
- ☐ 128K Memory £129.95
- ☐ 256K Memory £169.95
- ☐ 512K Memory† £259.95
- ☐ Eprom card socketed (192K - excluding Eproms) experimentation card with front interface £24.95
- ☐ Dust Cover that doubles up as a stand £14.95
- ☐ Modem P.O.A.

†Can only be powered if Medic disc system connected

### Packages

- ☐ 1 Megabyte disc drive (cased, inc. PSU) disc interface and parallel interface, with cables £249.96
  - ☐ 2 1 Megabyte disc drives, (cased, inc. PSU) disc interface parallel interface, with cable £399.95
  - ☐ 1 megabyte disc drive, memory inc., disc interface and parallel interface.
- |                                       |                                  |
|---------------------------------------|----------------------------------|
| 1 disc drive                          | 2 disc drives                    |
| <input type="checkbox"/> 64K £299.95  | <input type="checkbox"/> £449.95 |
| <input type="checkbox"/> 128K £329.95 | <input type="checkbox"/> £479.95 |
| <input type="checkbox"/> 256K £359.95 | <input type="checkbox"/> £509.95 |
| <input type="checkbox"/> 512K £449.95 | <input type="checkbox"/> £595.95 |

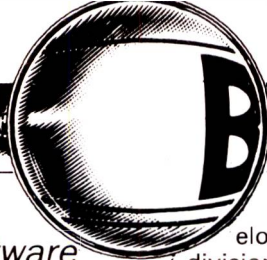
To order products please make cheques/P.O.'s payable to MEDIC DATASYSTEMS LTD. Allow 28 days for delivery. All prices include VAT. Please add £5 p&p.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

Signed \_\_\_\_\_





normal control codes.

## Applications software

A number of software packages are now available for the Integral. These include Microsoft's Multiplan, Ashton-Tate's dBaseIII, HP's own Memomaker and Visicorp's TK!Solver. On the software development front there are a number of Unix development tools, the C programming language and Basic.

The Basic is HP's technical Basic which is a version of ANSI Basic with extensions for maths, graphics and instrument I/O. Basic programs written on the HP 85/86 and on series 200 and 500 machines will immediately run on the Integral. Applications written in C in a Unix environment can be downloaded and compiled on the Integral. The C provided can access a Device Independent Library (DIL) for high-level control of instruments. And real-time extensions available through HP-UX provide interrupt-handling and priority setting for multi-tasking instrument control environments.

More software is being developed, both by HP's own software division and by independent vendors. It is unlikely, however, that the machine will have as wide a range, or as competitive prices, as the IBM PC.

Six disks are bundled with the Integral: a tutor, a utilities disk, HP-UX commands, standard applications, diagnostics and a system disk. All except the standard applications are described in this review; standard applications furnishes you with two editors (font and text), three games and several alternative fonts.

## Documentation

The Integral PC is supplied with two A5 manuals — a user guide and a comprehensive guide — and a tutorial on disk.

Both manuals are clearly written and well indexed. The user guide is a step-by-step guide to using the Integral, the comprehensive guide gives more information on each aspect of the machine. I found that the comprehensive guide didn't go far enough in

explaining the technicalities of the system, and should have been supplemented with a reference manual.

Beginners would be advised to forget the documentation and plug in the tutorial disk. This tutorial covers everything in the user guide and takes an estimated eight hours to fully absorb. It is broken up into eight lessons with each lesson subsequently broken into chapters; subjects include file organisation, use of windows, printing and creating files. Generally it's very well done, but it has a rather American 'Isn't this amazing' style. The Integral's documentation also includes a cartoon booklet showing you how to set up and start, and also how to pack the machine away for transportation.

## Prices

The Integral Personal Computer follows HP's tradition of high quality and high price it costs £5450. The optional mouse costs £152, and the Think-Jet printer on its own costs £550 with an HP interface or a Centronics interface.

## Conclusion

I started this Benchtest with considerable doubts about the viability of a machine that uses Unix in ROM and which is designed purely for a single user. However, HP has created a machine that makes an awful lot of computer power easy to use. The windowing software makes multi-tasking a natural activity with no worries about task priorities, foreground/background tasks and scheduling. One week of using this machine and then returning to MS-DOS on an IBM PC really made me realise the power of Unix.

As for the possible market for the machine, it is hard to tell who will buy it. Certainly, computer scientists who use Unix now will appreciate the benefit of a complete, luggable Unix system. Similarly, scientists using HP's existing scientific computers will find it a logical upgrade. The multi-tasking facilities may well draw other users who have outgrown operating systems such as MS-DOS.

From the nature of the manuals and software developed, it is obvious that HP also sees the machine selling to business and first-time users. But with its high price and limited and expensive software, I don't foresee many sales in this area. It may sell to those who want to find a way of switching to Unix at a reasonable price, or those who purely want to cast a vote against the IBM PC.

If nothing else, the Integral PC must be admired for its all-in-one-box approach, the state-of-the-art technology, easy-to-use multi-tasking, high build quality, and the ingenuity that went into making Unix a ROM-based operating system.

END

## Technical specifications

Processor:	8MHz 68000 supplemented with 16-bit graphics processor
RAM:	512k (additional 32k for graphics)
ROM:	256k
Mass storage:	One 3½in 710k micro-floppy
Keyboard:	90 keys, numeric keypad and eight function keys
Size:	8½ins × 13ins × 17ins
Weight:	25lbs
I/O:	HP interface bus (HP-IB, IEEE-488), two expansion ports, two human interface loops (HP-HIL)
DOS:	HP-UX UNIX System III
Bundled Software:	Personal Application Manager (PAM) and HP Windows in ROM. Six disks containing Tutor, Utilities, HP-UX commands, Standard Applications, Diagnostic, System commands.
Peripherals:	Built-in Think-Jet printer.
Options:	RAM expandable to 1.5Mbyte internally, 5Mbyte externally. Hard disks, printers, plotters and I/O cards.

## In perspective

There is little or no direct competition for the HP Integral PC. If it is purely considered as a single-disk transportable system, there is no doubt that it is very expensive, but that is comparing it with an MS-DOS transportable such as the Apricot or Compaq. If a Unix machine is what you are looking for, then this may well be the cheapest way of obtaining one with the added advantage of portability, although higher-priced Unix machines will be multi-user and higher performance.

As for its viability as a business transportable or professional beginner's machine, there are a number of IBM PC compatibles and MS-DOS transportables with a wealth of business software and a considerably lower price tag. Beginners looking for a particularly friendly business machine would do better with the Apple Macintosh, although the Integral is the friendliest way I've seen to introduce multi-tasking.

Where the Integral is really on its own is as a transportable for computer scientists and software engineers who work on a Unix mainframe, who could use it as a terminal at work and to develop software at home. Scientists planning to use its instrument control features would be well advised to look at the HP's lesser machines such as the HP-85 or 86 before paying extra for the Integral. But having said that, the Integral would be capable of monitoring far more complex experiments due to its multi-tasking nature.





## The new DATA GENERAL/One. The first full-size screen PC that businessmen can use in their local office.

Wherever businessmen travel, the new DATA GENERAL/One is pleased to follow.

That's because it doesn't only run on mains electricity but will operate for up to 8 hours on rechargeable batteries.

So you can use it anywhere your business takes you. On the train. In airport lounges. Even on location in factories or on building sites.

However, complete mobility is only part of the story.

The DATA GENERAL/One has a full-size 25-line high definition screen.

It also offers a 512KB memory, almost 1.5MB of integral disk storage and the ability to communicate with mainframes.

Equally important, the DATA GENERAL/One is the only portable of its kind that's compatible with industry-standard IBM® PCs. Just imagine how much software that gives you access to (like Wordstar®, Lotus 1-2-3™ and dBase II® to name but a few). All this performance comes in a briefcase-size unit that only weighs around 10lb.

Compared to that, you'll find anything else is rather a drag.



For full details and the name of your nearest Dealer post this coupon to: Dealer Operations, DATA GENERAL Limited, 7 Kenrick Place, London W1H 3FF. Or telephone Pat Cunningham on 01-935 9461.

Name \_\_\_\_\_

Company & Address \_\_\_\_\_

Phone \_\_\_\_\_

PCWP

 **Data General.**  
a Generation ahead.

IBM is a registered trademark of International Business Machines Corporation. Wordstar is a U.S. registered trademark of Micro Pro Int'l. 1-2-3 and Lotus are trademarks of Lotus Development Corp. © 1983. dBase II is a registered trademark of Ashton-Tate.



# Beating the system

*A rags-to-riches story could be yours — Ken Barker applies random number generation to the problem of winning a fortune from casino blackjack.*

Am I alone in feeling humbled, frustrated, humiliated even, by the enormous advances which have been made in computer games recently? Ten years ago I could sit down to a game of chess with any computer in the country, confident that it couldn't hold out for more than 10 minutes. But now I regularly get thrashed, not only at chess but at draughts, reversi, backgammon, go-moku — even Scrabble.

Is this really what computers were meant to do? Is mankind really destined to pour hours of concentrated effort into a sophisticated program just to emerge the loser? Surely, with all the number-crunching power of a modern machine, there must be a way of letting the computer do all the hard work so that we can improve our game.

Many's the time I've pondered this point as I sat brooding over a hand of cribbage — a game where there are many decisions to be made solely on probabilistic grounds. Could I program a computer, not simply to play cribbage itself, but to devise a strategy to improve my skill in ordinary face-to-face play?

The problem, of course, is lack of motivation: cribbage is a happy-go-lucky, time-wasting game, played for fun, not for blood. Writing thousands of lines of code to devise a world-beating strategy for cribbage would be like putting in hours of secret practice in order to beat your children at snap.

Last year, while browsing at a news stand, I picked up a booklet which contained the quote: 'Of all the casino games, blackjack is the one game where... you can actually turn the advantage in your favour by as much as 5%,' and immediately I knew that in blackjack I had found a game worth studying — and not just from the financial angle.

Blackjack is perfect for the kind of approach I had in mind. It is a 'one-sided' game, in the sense that the player plays against a banker who makes no independent decisions. There are situations which repeatedly occur in which the correct decision is far from obvious. There is only a limited choice of options at any given stage in the game, and because a pack of cards can be simulated using a random number generator, the correct strategy for any given

situation is easy to determine with a computer. Ready to make my fortune, I bought some more books on the subject and sat down at my micro.

For those of you who have never been into a casino, let me summarise the British version of the rules of the game. Blackjack is a simple version of the card game known as 21 or pontoon, with a few changes to reduce the odds in favour of the bank. Each player places a bet, which can be any amount from the table minimum (typically £3) up to the maximum (typically £200), whereupon the dealer gives two cards to each player and one to himself. The players in turn then ask for as many extra cards as they wish, one at a time, until they either choose to stick with the hand they have, or the total of their cards exceeds 21 (picture cards counting as 10, aces as one or 11), in which case they are said to have 'bust' and they immediately lose their bet.

When all the players have either stuck or gone bust, the dealer plays his own hand. He plays in exactly the same way as the players except that (and this is the first main difference between pontoon and blackjack) the dealer must keep taking extra cards until his hand totals 17 or more, and then he must stick. There is therefore no skill in the game for the dealer: his actions are determined entirely by fixed rules.

If the dealer busts, he loses and pays all the players who have not themselves bust. If the dealer does not bust, he pays all the players with a higher total than his, and collects from those with a lower total. If there is a tie, no money changes hands — another difference from pontoon, where the dealer always wins tied hands.

As in pontoon, if you are dealt two cards of the same value, you can split the pair by doubling your bet and getting a new card on each of the originals; this rule creates more headaches when programming than any other rule of the game. You also have the option of doubling down, which means doubling your bet and receiving exactly one more card. There is no five-card trick in blackjack.

In blackjack, though, the odds are constantly changing. If you are dealt two aces on the first hand, the chances of you getting an ace on your second

hand are smaller than they were previously because there are fewer aces in the pack. This is the basis of all winning systems. By watching the cards which have been played, you can get some measure of the odds against you. When your expected profit on a hand is negative, you bet the minimum; when the odds swing in your favour, you bet high.

## A winning streak

The first player to make a winning system popular was Edward O Thorp in his book *Beat the Dealer*, first published in the early 1960s. Thorp's system caused such a stir in Las Vegas that the casinos changed the rules — only to change them back again when players refused to play under the new rules!

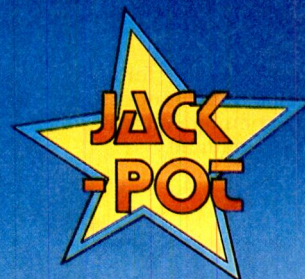
Other authors, programmers and mathematicians were quick to refine Thorp's strategy, and Las Vegas and the other gambling centres of the world were soon flooded with winning systems and skillful players (known as 'counters') who could use them. Before long it was impossible to use the strategies outlined in *Beat the Dealer*: every casino trained its personnel to watch out for anyone who made a minimum bet several times running and then for no apparent reason dramatically increased his bet. Such players were soon banned from the blackjack tables.

New strategies were devised which kept the bet range down in order to conceal the fact that a system was being used. When I decided to investigate blackjack there were several books available, all of them proclaiming their system as 'the best', 'the most effective', 'the least detectable under all playing conditions', and, invariably, 'computer-proven to be the most workable blackjack system available today'. But how to decide which to use? And just how effective are these systems anyway?

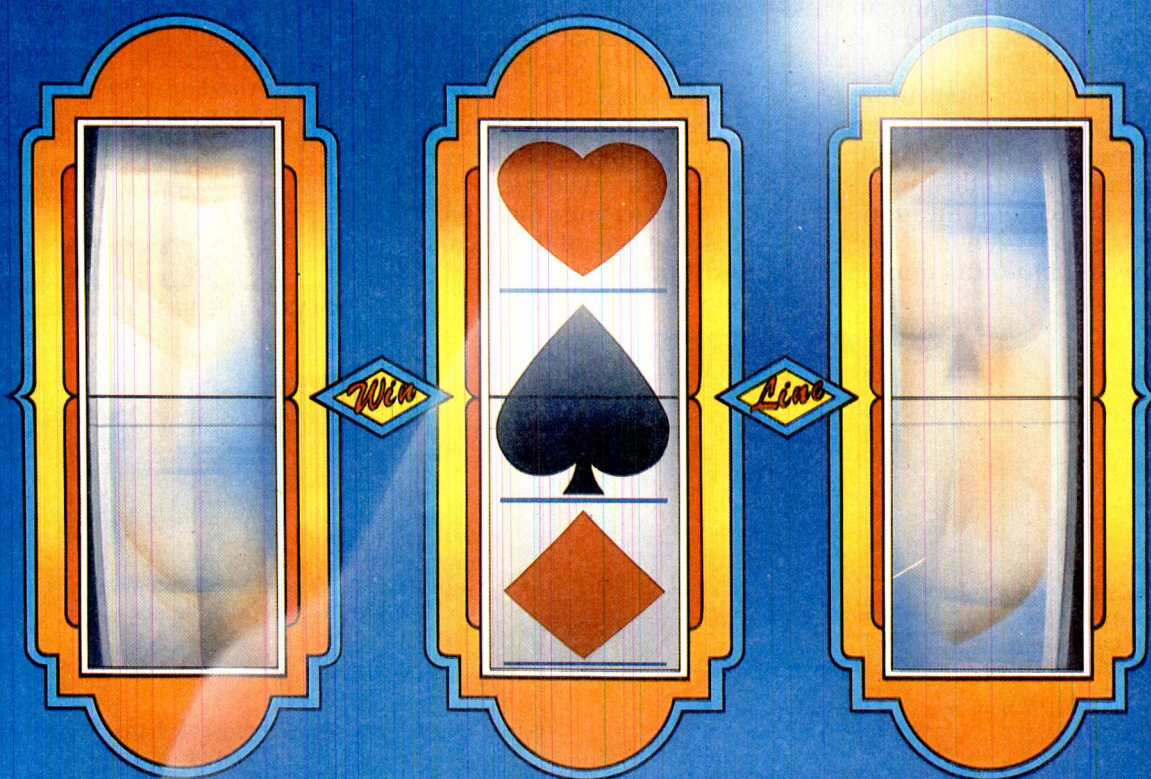
I started out by writing a 1500-line interactive program which took the part of the dealer while I played the game. Such a program would be fairly easy to test, fun to play around with, easy to modify into the number-cruncher which would do my analysis, and be useful for practice when I finally had my system designed.



# Black Jack



POI



I wrote it in Pascal, designed from the top down according to the best traditions of structured programming. I did this more for reasons of convenience than anything else, but was pleased to see structured programming vindicated. The program was as easy to test and debug as I had hoped, and I soon progressed to a version which took the part of both the player and the dealer, and which I could leave running overnight to produce statistically significant results.

The biggest problem was the difficulty in debugging a program which includes a pseudo random number generator. Most generators have a period of  $2^{16}$  (that is, after generating  $2^{16}$

numbers, the sequence of numbers repeats itself); as I intended to play several million hands of blackjack each night, I had to include a generator of my own.

Most random number generators are multiplicative: that is, each number is generated by multiplying the previous number by some suitable constant, adding another constant, and taking the remainder when divided by a third, fairly large constant, thus:

$$X_{n+1} = (aX_n + c) \bmod m$$

As each number depends only on the previous number, and since there are only  $m$  possible values for  $X_n$ , the sequence must start to repeat itself in less than  $m$  numbers.

I decided to use the additive random number generator of Mitchell and Moore. This works by adding two previous numbers from the sequence together according to the formula  $X_n = (X_{n-24} + X_{n-55}) \bmod m$  where the first 55 values are assigned arbitrarily, and the sequence is taken to be random from, say,  $X_{50000}$ .

As each number depends not just on the previous number but on the previous 55 numbers, it can be shown that the sequence has a period of at least  $2^{55} - 1$  which is approximately  $10^{15}$  — far more than I was ever likely to need.

An added bonus of writing my own code for the generator, rather than relying on the system's, was that I could





Tecmar Graphics Master™ for high-resolution colour and monochrome graphics, with complimentary PC Paintbrush™ programme.

# TECMAR MAKES YOUR PC EVEN BETTER.

Tecmar is the leading manufacturer of add-on peripheral equipment for the IBM® PC and Apple Macintosh™.

In fact, Tecmar offers more than 150 products in all, covering an enormous variety of applications. These extend through graphics and communication products, specialized interfaces, memory and multifunction

cards, to over 30 hard-disk configurations.

And Tecmar backs up its products with the best support services available.

So, when you're ready to bring out the best in your PC, ask for our catalogue.

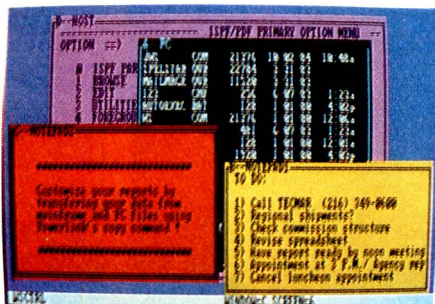
Contact your local Tecmar dealer or one of the Tecmar distributors listed here.

Tecmar International Inc.,  
Chaussée de la Hulpe 181,  
1170 Brussels, Belgium  
Tel. (02) 672.23.98 Telex 20256  
Authorized distributors:

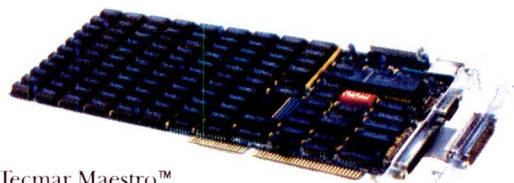
- First Software, Basingstoke, England. Tel. (0256) 463.344
- Electroplan Ltd, Royston, England. Tel. (0763) 411.71

## Tecmar

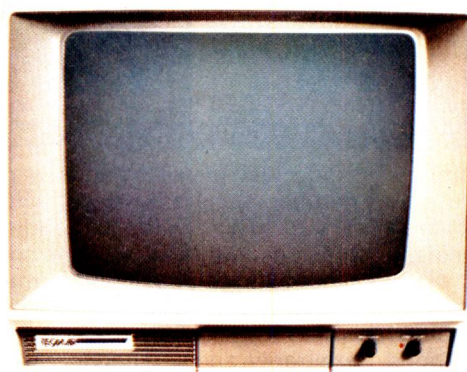
MAKES THE BEST PC'S EVEN BETTER



Tecmar Powerlink™ links your PC to mainframes, with windowing and easy-to-use file transfer software.



Tecmar Maestro™ multifunction board to enhance your IBM PC AT, with 24 complimentary business productivity programmes.



Tecmar flicker-free high-resolution Colour Monitor, with 16 true colours and PC Paintbrush.

Tecmar MacDrive™ fixed or removable hard-disk drives for your Apple Macintosh, with print spooler, hard-disk partitioning and back-up software.



IBM is a registered trademark of International Business Machines. Macintosh is a trademark licensed to Apple Computer, Inc.  
PC Paintbrush is a registered trademark of the ZSoft Corp.



# PROGRAMMING

write it so that it needed a 'seed' before it would run. This meant that on successive nights I could use different random numbers to simulate the shuffled pack of cards; it was simply a question of using a different seed when the program was initialised.

But there were problems which I was not expecting. The mathematician Von Neumann said that anyone who considers arithmetical methods of producing random digits is in a state of sin; after wasting several hours attempting to do just that, I was starting to believe him. Normally, when you debug a program, although the bug may take weeks, months, or even years to emerge, when it is finally spotted you can usually be certain that the program isn't running as it should, and the errors are repeatable. With random numbers, I discovered, there is such a thing as a probabilistic bug!

## Debugging the program

When I first ran my program, the results appeared a little biased: the machine seemed to be dealing more picture cards than it ought to. I repeated the run each night for several nights, and found that sometimes the proportion of picture cards was higher than it should be, and sometimes it was lower—but there seemed to be rather more nights when there were too many picture cards than

when there were too few. I carefully examined the code, but could find no coding errors. Eventually, I decided that I would have to analyse the results statistically.

I borrowed a textbook on probability which told me more than I wanted to know about chi-squared tests and other statistical tests to determine just how likely it is that the results of a random test really did occur by chance. After an hour's calculation I had found that the probability of my results could have occurred by chance, but the probability of this happening was only one chance in 20—so it was 95 per cent certain that my program had a bug, but there was a five per cent chance that I had just been unlucky.

I had already run the program every night for a week, and was getting impatient to start playing in a casino—winning the vast fortune the books had promised me. Still, I reasoned, better to get the maths sorted out first and be sure of what you're doing.

A second week of calculation followed, with the machine buzzing and whirring all night, and the results this time still showed a slight bias towards picture cards but not as much as previously. I repeated the chi-squared tests and even after allowing for the previous run there was still a bug in the program, with 95 per cent probability.

I still don't know whether I was just

unlucky or whether there really was a bug, because at this point I lost patience. I gave up on the code I had written and started with new code. It was still based on the Mitchell-Moore algorithm, but I structured the program differently, styling it so that I would be able to carry out the statistical tests faster. 10 test runs of the new routines went through the machine on the first evening. Nine of them gave results which were exceptionally close to the theoretical values, but to my deep dismay, test run number seven gave a result so unlikely it could only have occurred by chance once in every ten thousand runs.

After another thousand runs, all of which gave values exactly as the chi-squared tests said they should, I was satisfied that results as amazing as run number seven would only occur once every ten thousand runs, and it was just bad luck that I had turned up such a run so near the beginning of my tests.

The books all agreed that with a perfect playing strategy, the odds against you are about 0.67 per cent. As a final test of my program, I set it playing, using the strategy it had calculated for itself. After five days of machine time, the machine had played about six and a half million hands and the average loss per hand was 0.65 per cent, well within an acceptable margin of error.

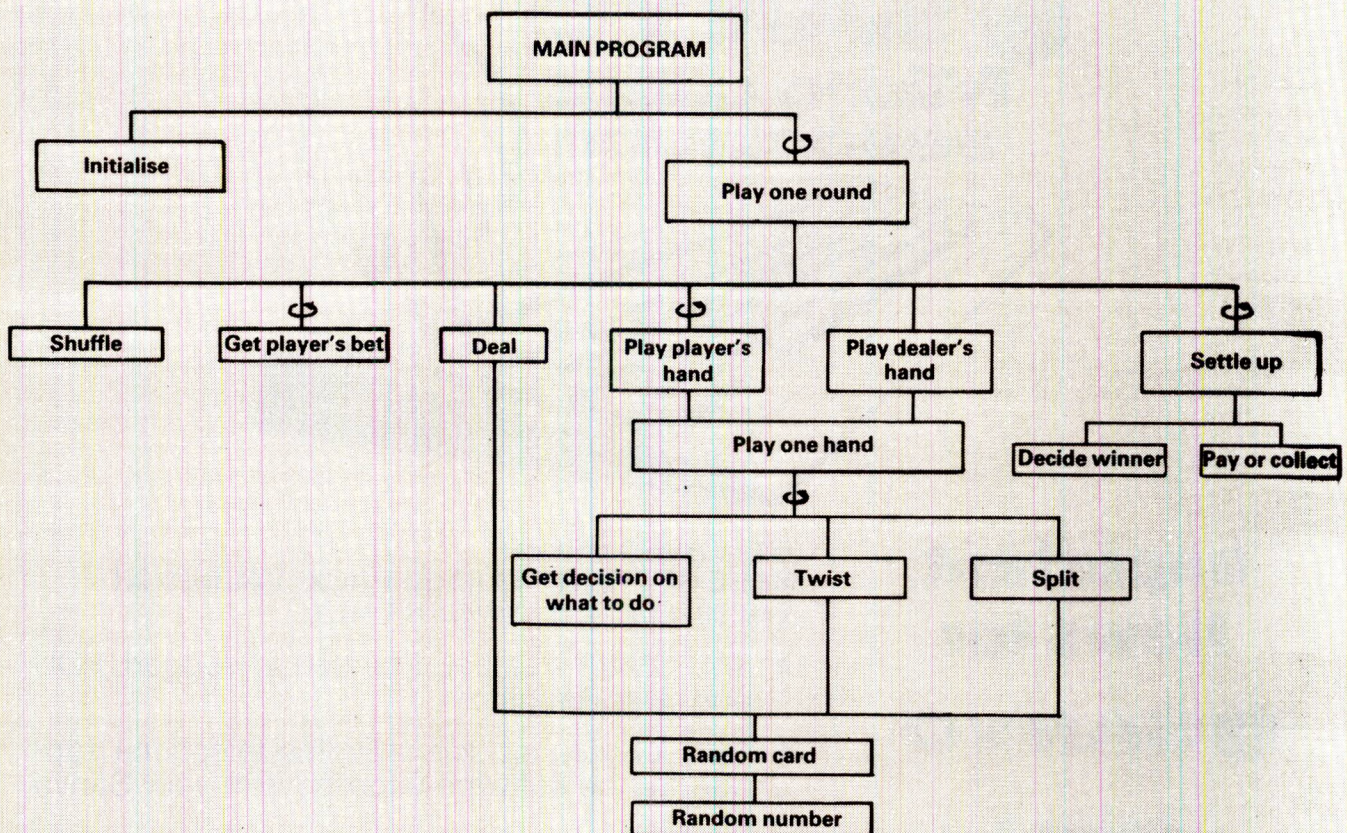


Fig 1 The main program in flowchart form



# QL BANK ACCOUNT

Fed up with infrequent bank statements? Avoid bank charges and keep up to date with QL BANK ACCOUNT. Check your mortgage HP, standing orders! Budget those bills.

- ★ Automatic posting of standing orders and other regular payments or credits.
- ★ Delete, amend and even backdate entries. Scroll through your statements. Comprehensive 80 column display and printout.
- ★ 6 different entry search routines!
- ★ Post items to headings name by YOU to suit your circumstances. Print out individual accounts and summary, e.g. all payments to building society or motoring expenses.
- ★ Output of bank statement and accounts to most Epson compatible printers. Makes automatic use of memory expansions. Demonstration bank account included.

Cartridge and Manual £19.95 + 50p P&P

*Cheques and POs to:*

**CENPRIME SOFTWARE**  
Dept. PCW  
10 CASTLE STREET  
RUGBY CV21 2TP  
Tel: Coventry (0203) 686162

## NEW DIRECTORY UTILITIES PLUS COPY PROTECTION ON APRICOT

Send for details of our new software protection method which allows your programs to run from other disks but not to run unless issue disk is present. Issue disk cannot be correctly copied by conventional methods. Licence £100 + £5 per formatted disk. All the following software from TWINDATA uses this method.

**DMAN (Directory Manager)** Gives a full-screen sorted directory display. Scroll in any direction using the cursor keys to select a file. Then use a function key to DEL/COPY/RENAME/TYPE the file. "MORE DETAILS" f/key opens a window with date, time, size and attributes. Any attribute can be changed by a single keystroke. No more typing - just point and press! £55 + VAT.

**SDIR (Super Directory)** List any directory in sorted sequence, pausing after each screenfull. All details that the standard DIR gives are shown, plus each file's attributes. An analysis of disk use is also given, including % full. £35 + VAT.

**CHATTR (Change Attributes)** Our popular program to change a file's attributes. Write-protect or hide files; reveal hidden files; alter BACKUP strategy. A proven tool. £25 + VAT.

All 3 available as "Directory Pack" for only £105. (A saving of £10 - plus 4 FREE programs: ASCTOBIN, BINTOASC, REPEAT, UNMS)

All Programs require MSDOS2. DMAN, SDIR AVAILABLE ON APRICOT (IBM PC SOON); CHATTR AVAILABLE IN BOTH FORMATS NOW.



This software package has been  
officially recognized by ACT for use  
with Apricot & Sirius personal Computers

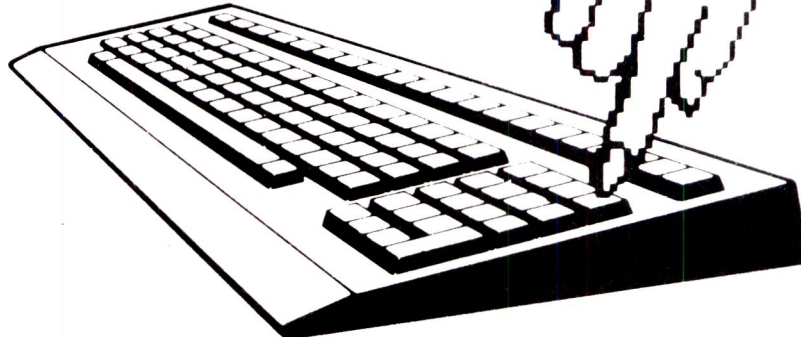


**TWINDATA LTD**  
461 A, Green St  
Upton Park  
LONDON E13 9AX  
Tel: 01 552 0453



# SANYO

## Micro users association



## Important News for



# SANYO

## micro owners

**EXTENDED OFFER.**  
**FREE GETTING STARTED PACK, VALUED AT**  
**£49.99. LIMITED NUMBER ONLY**

- ★ The SMUA has been formed to support YOU and your computer
- ★ Our services include unlimited telephone support for the software supplied with your Sanyo micro
- ★ For further details dial 100 and ask for FREEPHONE SMUA



# PROGRAMMING

The end was in sight. I had worked out the correct way to play the cards, and now all that was left was to determine how to decide when the pack is 'good' and thus when I should increase my bet, and when the pack is 'bad' so that the bet should be kept to a minimum. This proved to be the easiest and most interesting part of the whole experiment.

No-one can memorise exactly which cards have been played and simultaneously calculate how they affect the odds in your favour in a game of blackjack, so all winning systems use a simplified method which consists of assigning numerical values to each of the cards, positive if the card is good for the bank, and negative if the card is good for the player. By keeping a running total of all the cards played, the player can determine when the chance of winning the next hand is greater than zero, and thus when to increase his bet.

The question is: what are the best values to assign to the cards? Rather than let the computer attempt to find a system, I compared six different popular systems with one I created myself based on the knowledge I had acquired from my study of the game.

At least two of the books Revere and Canfield asserted that they had tested all the other systems on the market and analysed them by computer. As both of them said their system came out better than any other, I was particularly interested to see how well they fared.

After twelve million hands, the results were fairly conclusive. There was very little to choose between five of the systems (including my own, I was pleased to note). Thorp's system took sixth place, which, considering it was the first ever published and the foundation for all the others, is very creditable. Canfield's so-called 'expert system' came a very poor seventh.

## Conclusion

And now the most important questions: how much can a card-counter expect to win? And why, if I have got such a great system, am I telling you all about it rather than going into a casino and making my fortune?

The answer to the second question is contained in the answer to the first. As I have explained, the amount you expect to win depends on the ratio of your maximum to minimum bet. If the ratio is too small, you won't win. If it's too big,

casino personnel will spot what you're doing and throw you out. I can't offer advice on what is an acceptable level of betting, but from the experiences of Messrs Canfield, Revere, Thorp *et al*, you won't get away with a much bigger spread than 5:1.

The minimum bet in a typical casino is £3. So, assuming a 5:1 betting spread, you will need to bet £15 when the odds are in your favour. If you split a pair, you're now up to £30, and if you double on both of the two hands (and you must double if you don't want to sacrifice any of your profit) you could be betting as much as £60 on one hand. Playing this kind of money, there's little point in gambling at all unless you're prepared to lose at least £150 an hour.

But what about the profit? You only lose £150 an hour sometimes and at other times you win. On average, a winning system will win money — by definition.

Indeed, in the long-run, you will win. The books all agree (although they are rather elusive about how great your fortune will be) and my calculations agree with them — and the rate of winning (with a betting spread of 5:1) is no less than 0.3 per cent. In financial terms, this means that if your minimum bet is £3, and for which you are risking £150 an hour, you can expect a net profit of around 90p — and that's before tax!

For those of you who want to write a program to play blackjack, either to play the game against the machine as dealer or to check my results, here are a couple of tips to point you in the right direction.

Firstly, make sure you thoroughly understand all the rules you want to include, together with their implications, before you start to program. If you want to use the rules played in the UK, the only book I have discovered which explains them correctly is *A Book on Casino Blackjack* by Cl Tulcea. Incidentally, this is one book whose results agree very closely with mine — of all the books I've mentioned, this is the only one I would recommend for serious study.

Secondly, I strongly recommend a top-down approach to writing the program. Start by breaking the main task into a few fairly big sub-tasks, each of which will be split into several smaller sub-tasks.

If you do this thoughtfully, the program can be written in several stages, with each stage being thoroughly tested before it is incorporated into the code. A flow diagram illustrates this approach (Fig 1).

Finally, despite all my testing, there's still the possibility of an error in my results. If you do write a blackjack program which gives results substantially different from mine, or if you can think of a new tactic to divert the casino from spotting a counter at work, then do let me know. **END**

Number of hands dealt	6518742
Hands dealt from 'good' decks	1034811
Hands dealt from 'bad' decks	5483931
Total loss (betting £1 per hand)	£36,672
Loss on 'bad' decks	£50,737
Profit on 'good' decks	£14,065
Average loss per hand	0.56 per cent = 0.56 pence per hand
Betting spread necessary to break even	3.6:1
Profit with betting spread of 5:1	0.3 per cent = 0.3 pence per hand
(The average loss of 0.67 per cent quoted in the article assumes a fixed playing strategy. By using a different strategy for good and bad decks, the loss can be reduced to 0.56 per cent.)	

**Fig 2 Assessment of strategy**



*'He might be a child prodigy, but he could let someone else have a go occasionally.'*





# Telesketch

*The Telesketch is a combination of communications terminal and stand-alone micro, but does the UK market have room for its impressive specification? Stephen Applebaum takes a look.*

The Telesketch is a machine with an identity crisis. On the one hand it is a communications terminal, while on the other it is a stand-alone computer with powerful graphics capabilities. The only way I can describe the Telesketch is as a kind of overpriced One Per Desk. In fact, the basic machine could cost some £800 more than the OPD, having a provisional price of somewhere between £1,800 and £2,000.

## Hardware

I say the Telesketch is overpriced because unlike the OPD, and even some smaller personal micros such as the Amstrad, it does not come with any kind of storage device fitted as standard. Not even a mere cassette recorder. However, that aside, what you do get is a Motorola 6809E-based machine with a 512 × 384 pixel green-screen monitor, 64k of dynamic RAM, 16k of static RAM (expandable to 32k), 32k ROM (expandable to 128k), a Centronics interface, modem and telephone handset, and a very accurate light pen, all set into a compact 9ins × 10ins × 15ins case. For input, there is a qwerty-style keyboard which attaches to the main console via an ugly, short length of wire.

Although the review model was fitted with all its graphics and communications software, it lacked even the slightest hint of a programming language. I was assured that if and when the machine goes on sale here in the UK, it will be fitted with either Basic or Forth (depending on the user's preference), plus a spreadsheet, as standard.

Externally the Telesketch is bizarre, looking like something out of an old sci-fi movie. In a groove, on top of the main console, sits the telephone handset, while the light pen sticks out of a receptacle in front of the screen. Also on the front is a small hole which leads to a microphone, enabling the machine to be used as one would an intercom, freeing the hands for making notes or lifting the odd cup of coffee.

On the rear of the unit are several interfaces and minor controls. Working

from the left there is a brightness control, an expansion bus to which an interface box with a Centronics interface can be attached, a hand-set plug, a light pen socket, phone line plug and reset switch.

Unscrewing the Telesketch's bottom and lifting off the top uncovers a large PCB packed chock-a-block with chips. The RAM and ROM were immediately evident, as was an interesting, but obscure, custom chip. Towards the rear of the machine a mass of wire runs to a power supply and speaker, as well as running below the board to the monitor.

## In use

Getting started with Telesketch is quite simple: you plug the unit into a telephone socket (like any hard-wired modem), plug into the mains and switch on.

Immediately after power-up, Telesketch goes into 'idle' mode. Idle, in this case, means that it can transmit and receive files to and from another Telesketch without any intervention from the user. By switching the unit into 'Auto-on' mode, the user can 'program' the machine to send a file at a preset time. This is done by storing a file in the system's catalogue, along with a time at which it is to be transmitted. A file need not consist only of text but can also be graphics, or a mixture of the two.

Lifting the light pen or hand-set switches the system into 'phone' mode. The screen changes to display a telephone touch-pad, volume control for the speaker, a directory of telephone numbers, a 'soft' keyboard for data entry using the light pen, and a menu along the bottom of the screen.

When in phone mode, Telesketch can be used in the same way as a normal phone with the additional facility of being able to send both graphics and text using a 'send' option. Unlike a normal phone, a number can be dialled onscreen using the touch-pad and light pen, or via the hand-set. To save time, numbers can be entered into the

machine's telephone directory from the soft keyboard. Up to 40 numbers can be stored in the machine's battery-backed static RAM, being retained even when the machine is switched off. A number stored in this way can be automatically dialled by touching the appropriate box in the directory. If a number is engaged, a retry option enables Telesketch to redial the number up to 16 times at intervals of 30 seconds.

As mentioned, Telesketch features an onboard modem. By dialling up a public database and switching to terminal mode when the tone is heard, Telesketch can be used just like any other telephone and modem.

Both Bell 202 and CCITT V23 transmission requirements are supported, so bulletin boards cannot only be dialled within Europe, but in the US too. Both 300 and 1200 baud are supported by the modem, the latter not only being useful for logging onto boards such as Prestel, but also for talking to other Telesketches.

At the time of publication the Telesketch had not received BT approval, although there were no foreseeable problems as to why it should not.

## Operation modes

The menu at the bottom of the screen in phone mode gives access to five modes of operation: phone, draw, text, file and terminal.

In draw mode you can create pictures to send to other Telesketch users. The obvious machine to compare the Telesketch's graphics facilities with would be the Macintosh, as they are both in the same price bracket. However, close inspection shows that the two are worlds apart, each being equipped for very different uses. Whereas the Mac gives the 'arty' user full range with its different textures, paint sprays and so on, most of Telesketch's tools are based on simple mathematical figures, such as the square and the circle, and are orientated to the technical rather than the home/business market.

Just as in phone mode, all the various



drawing tools are selected from a menu along the bottom of the screen. Whereas Macintosh users have a mouse to control the cursor, the Telesketch uses one of the most accurate light pens on the market, resolving to plus or minus half a pixel. And when you consider that graphics can be drawn straight onto the screen with a greater degree of accuracy, it is a wonder how the mouse has become so successful.

True, we've all heard the reasons given by the big guns, such as Apple and Microsoft, as to why they have chosen to adopt the mouse rather than a light pen; the most obvious one being that it is more comfortable to use. But even this is overcome by the Telesketch's screen size. Every corner of the screen can be reached with the elbow resting on the desk, so there is little chance of contracting pins and needles through holding up your arm for too long.

Gamma Communications Corp, the manufacturer of the Telesketch, considers the light pen to be such a good product in its own right that it is anticipating selling it on its own, as well as with the Telesketch.

One of the beauties of the Telesketch is its ease of use, something that is highlighted by the draw option. For example, to draw a rectangle, all you do is touch the appropriate option in the

menu with the light pen, and then pinpoint the lower-right, lower-left and top-left corners on the screen. The rectangle will then be drawn automatically, between the points. Practically the same method is used for drawing arcs, polygons and lines, as well as perfect vertical and horizontal lines. Text can also be input through the keyboard to annotate diagrams.

Unfortunately a FILL command is missing, but that can be rectified by using 'write', an option allowing very accurate free-hand drawing. And, if you make a mistake, single pixels or whole blocks can be removed with the aid of some neat erasing functions.

The third mode, 'text', provides the user with a crude word processor. Telesketch's manual points out that a document can be as long as 99 pages, although I would not like to use the machine for writing a full-blown article, mainly because the screen only operates in 40 columns and there is no word-wrap facility. The available functions, however, make the Telesketch perfect for letters and short notices.

Apart from the lack of a word-wrap facility, text mode is quite fun to use. 'Move' is an impressive little function which allows text to be transported from one part of the screen to another, simply by underlining it with the light pen and then touching a point on the

display where you want it to reappear. 'Copy' works in much the same way, except this time the original text is left onscreen, unlike with 'move' which erases it.

Several formatting functions such as 'justification', 'insert' and 'tab' are available, but as these are the only ones, text mode is not suitable for serious word processing.

One of Telesketch's fanciest features is the ability to send files containing either graphics or text down the line to another Telesketch. At any time during a phone call, one of the machines can be switched into 'file' mode, and one of the files in the machine's catalogue can be sent down the line to the user at the other end. This is a much quicker way of sending files than in text or draw mode, as it automatically transmits the whole document in one go, rather than page by page. It takes about 30 seconds to send four pages of text or graphics.

Of course, it isn't possible to talk while a document (or page) is being transmitted, because the two would then be using the same line.

Along with a document name, Telesketch's catalogue displays characters which indicate to the user the time at which a file was received, the phone number of the sender, and the type. Urgent files can even be marked with a code which causes a beep to go off at a specified time, thus reminding the receiver to read the message.

The fifth and final mode, 'terminal', literally turns the Telesketch into a stand-alone computer, utilising either Basic or Forth as its language. Unfortunately, terminal mode was not fully implemented on the evaluation model, although the functions available are no less than you would expect to find on a machine in this price bracket. One very Mac-ish feature is the inclusion of an onscreen calculator, which can be operated using the light pen. There is also a direct connection mode which allows the Telesketch to be linked to a mainframe via a bi-directional RS232 interface, some powerful editing functions and a terminal mode which uses the built-in modem.

## Conclusion

As it stands, the Telesketch is an excellent little machine although it is overpriced, even with its impressive specification. Several enhancements, including floppy disk operation software (the hardware is already fitted), bubble-pack software (the hardware is already present), a 640 x 480-resolution monitor, colour, a video digitiser, and various ROM-based packages, are planned. But until these are available, the Telesketch could have a very limited market in the UK.

Anyone who is interested in becoming a Telesketch dealer/distributor should contact Andrew Sheldon on (06928) 2468.

END

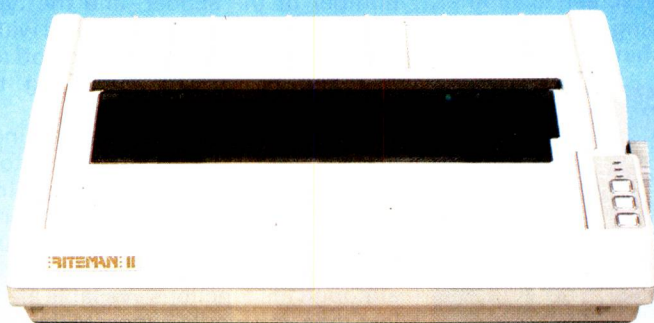




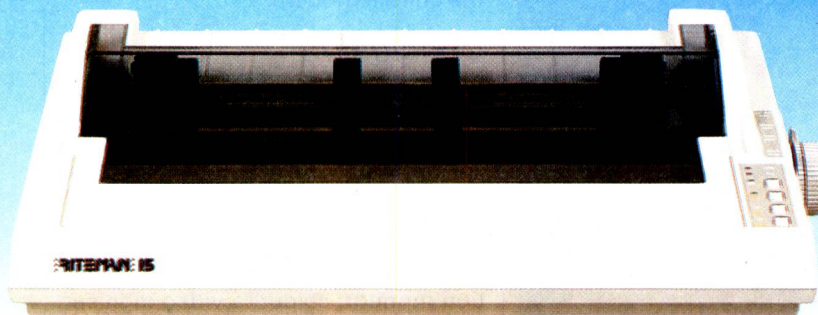
# :RITEMAN:



Riteman F Plus with 80 column, 105 cps and Epson FX 80<sup>®</sup> compatibility



Riteman II features 80 column, 160 cps and Epson FX 80<sup>®</sup> compatibility  
Riteman Blue Plus with 80 column, 140 cps and IBM<sup>®</sup> PC<sup>®</sup> compatibility



Riteman 15 with 136 column, 160 cps and Epson FX 100<sup>®</sup> compatibility



## C. Itoh's **Riteman** range of printers – the **Rite** choice in low cost printers.

The Riteman range, available from C. Itoh, brings you big printer performance in units which set new standards for compact, reliable printers.

Whether you need a lightweight, full-featured or high-speed multi-mode commercial model, the Riteman range offers the print speed, quality and reliability you need.

### **Riteman**

F Plus low cost dot matrix printer with 105 cps print speed, is compatible with Epson FX 80<sup>®</sup>, and with its unique paper handling and stacking system the Riteman F Plus uses the minimum of space in operation.

### **Riteman**

Blue Plus is specifically designed to complement the IBM<sup>®</sup> PC<sup>®</sup>, and is compatible with all three of the most popular modes of operation: IBM<sup>®</sup> Graphics Printer, Epson RX 80 FT<sup>®</sup>, and MX 80 FT<sup>®</sup>. You even get quad density mode for quality graphics.

### **Riteman**

II gives 160 cps performance in a unit small enough to fit in a 3 inch deep briefcase. Features include 2k buffer and expandable 8k buffer, 256 programmable character modes, proportional spacing, and Epson FX 80<sup>®</sup> compatibility.

### **Riteman**

15 is a 15 inch wide paper, 136 column printer which delivers 160 cps. Features include six graphics modes, 128 typesets, and nine sets of foreign characters. The ideal business machine, it is also Epson FX 100<sup>®</sup> compatible.

All models, except Blue Plus, feature NLQ print-mode for word processing applications.

IBM and PC are registered trademarks of International Business Machines. Epson RX80 FT, MX 80 FT and FX 100 are registered trademarks of Epson Corp.





# £399 TURNS YOUR BRAINBOX INTO A REAL CHATTERBOX!



Computers are like people. They can learn from each other. But first they have to communicate. If your computer keeps itself to itself, why not introduce it to the Chit-Chat Communications Pack from Sagesoft?

Chit-Chat is a versatile data communications program that opens up a whole new range of possibilities. Data can easily be transferred, even between incompatible machines, either by direct cable connection, or by telephone, using a modem.

Chit-Chat also gives you access to electronic mail systems such as Telecom Gold, Easylink, and One-to-One plus viewdata services like Prestel. The program is simple to understand, easy to learn and use, and is currently available on IBM PC and compatibles, Apricot, Wang PC and Sharp 5600, with many more to follow.

The Chit-Chat Communications Pack at only £399 + VAT, includes the Chit-Chat program, a state-of-the-art modem, specially made to Sagesoft specifications by Thorn-EMI Datatech. No knobs or switches, just sleek good looks and simple, error-free operation. Autodial and autoanswer facilities are incorporated and the unit is entirely software controlled. An RS232 cable and power pack are included in the package.

Chit-Chat software is also available without hardware.

INCLUDES FREE  
SUBSCRIPTION WORTH £100 TO

**TELECOM GOLD**

## **SAGE CHIT-CHAT**<sup>TM</sup>

Please send me more details of Sage Chit-Chat Communications Pack and my nearest dealer.

Name: \_\_\_\_\_

Position: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Tel: \_\_\_\_\_

Sagesoft Limited, NEI House, Regent Centre, Newcastle upon Tyne NE3 3DS.  
Tel: 091 284 7077. Telex: 53623 SAGESL G.

**BETTER SAGE THAN SORRY**





# Torch Graduate

*Twin-disk, 256k IBM PC compatibility on a BBC Micro for £1000 seems an alluring offer, but is it possible? Jon Vogler tests the Torch Graduate.*

Within the close-knit tribe of Cambridge computer entrepreneurs, the name of Martin Vlieland-Boddy continually occurs. Joint founder of Torch only a few years ago, he fell out with the financiers and left to set up Data Technologies Ltd, a small design and development company, whose first significant product was the Graduate. Data Technologies first advertised it a year ago, then — silence! No product appeared on dealers' shelves.

Delay-shocked users of BBC Micros had already been rescued once by Torch, whose Z80 second processor reached the showrooms long before its 'official' Acorn rival. Once again, Torch played the knight in shining armour.

The Torch range of micros begins with a small Z80 board which fits inside

a standard BBC computer, giving CP/M capability and 64k of memory. It ends with a stylish business machine that hides enormous power: a massive 20Mbyte hard disk, coupled with a Motorola 68000 processor capable of running substantial multi-user systems; multi-tasking Unix and other high-power languages; and up to 1Mbyte of RAM.

However, there is still a lack (at least in the UK) of business applications software on Unix. Torch has hitherto deftly avoided challenging the giants in the MS-DOS arena. This policy has kept the company small but healthy. It has also left a noticeable gap in the product range: none of its products could run the 'sexy' executive software that has sprung up around the IBM PC —

programs like Lotus, Framework, Symphony and dBaseIII. It was into this cavernous hole that the Graduate, with an MS-DOS operating system (so close to IBM's PC-DOS as to be virtually indistinguishable), and with quantities of random memory or memory expansion slots, fitted neatly.

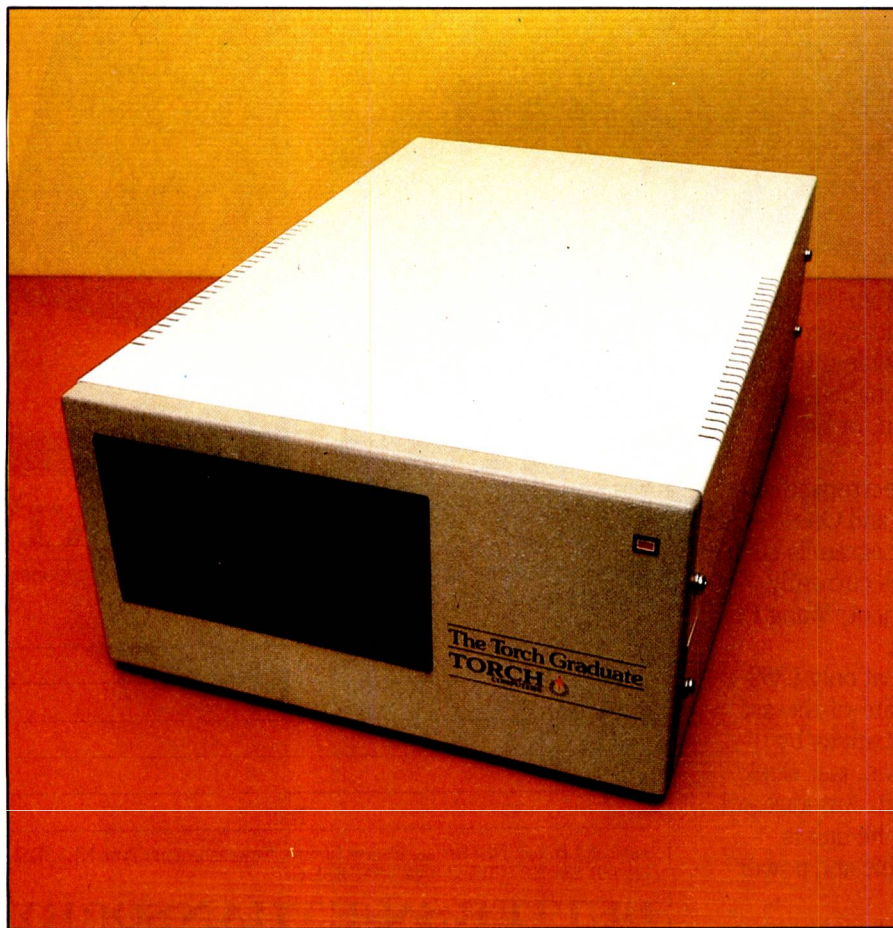
Then Torch too misjudged how long it takes to convert a good design into stacks of boxes on dealers' shelves. It allowed advertising to continue and soon had a flood of orders — but no Graduates. It is now available without delay and has 256k of RAM, two 320k (formatted) disk drives, no variations and, bundled with an excellent suite of integrated Psion Xchange software, it sells at £999.99 plus VAT.

## Hardware

The Graduate is a 6in-high steel box, 10ins wide and 16ins deep, in the front of which are dual Cannon disk drives. It is solidly constructed and pleasantly finished in two-tone hammer grey, and the top cover easily removes to permit service access. Inside are the disk drives. In operation these made a slight clanking sound. On one occasion a disk did not eject, but proved easy to ease out with fingers. Torch tells me that present production machines are using quieter, Epson disk drives. There is also a separate power supply (no more problems with the BBC overheating) and an acceptably silent cooling fan. A single, enormous, motherboard bears the 8088 16-bit processor running at 5MHz, and an array of RAM chips (the 256k can increase, with a standard expansion board, to 640k — adverts quoting 1.2Mbytes were in error); and two welcoming expansion slots. While this is less than the five on the IBM PC itself, Torch points out that, unlike the PC, you do not need to tie them up with colour graphics or printer ports: these are all provided by the BBC.

Access to the motherboard is restricted by the disks above it, but would only be required for repairs. The expansion slots are readily accessible.

A good feature is that the unit will operate as well on its side (with the disk





drives vertical) as on its four rubber feet. For many users this may be the most convenient arrangement. The 32-strand ribbon cable that plugs into the BBC's '1MHz' bus connector is just too short for the device to sit, on its feet, anywhere except just to the right of the BBC. I found it very convenient, on its side, to the right of the screen. To work with the Graduate the BBC needs no internal ROM fitting, so connecting up is a matter of a few seconds: insert the ribbon cable into the socket beneath the BBC's keyboard and plug the Graduate into the mains.

### In use

Switch on the Graduate and it boots the MS-DOS operating system from disk. If no disk is present it 'looks down' the 1MHz bus, becomes confused, waits and eventually signals an error message. Put in the right disk and it boots MS-DOS forthwith. Press the BREAK key and it automatically re-boots. Jerky screen scrolling is due to the screen memory all being held in the Graduate box and having to come across the 1MHz bus; however, Torch informs me that, in current production machines, this problem has been overcome.

The commands are standard MS-DOS so, although many, such as COPY and DEL, are familiar, others will be a little strange to BBC users. For example, DIR for directory (equivalent to the BBC's CAT), while DIR/W spreads the directory across the screen width and stops it scrolling. BBC users will miss the Beeb's twin (text and graphics) cursor, so useful for copying text from higher up the screen. MS-DOS has only one cursor but offers instead soft keys that repeat either all or part of the last command typed in, which I found most inferior.

But what I grieved for most of all was the BBC's 32-line-deep screen. MS-DOS uses the pitiful IBM standard of only 25 lines and, with some software, even all this is not available. Psion's Xchange suite, for example, likes to use the top five lines as a 'control area' and the bottom three as a 'status area', which means you are down to virtually half a screen for text—quite inadequate when rapidly scrolling through a spreadsheet or trying to edit text. Using Perfect Writer's split screen, an invaluable aid to rapid text juggling, I was left with text areas no more than 10 lines deep. Very restrictive.

My other grouse is the lack of speed. It is not just the Graduate: a PC or a Compaq would be the same. MS-DOS on floppy disks is an awfully slow system. First there is the dreadful disk shuffling. Even the simplest command, such as COPY (a file from one disk to another) requires that MS-DOS has been loaded. I have become used to Torch's Z80 second processor, which employs a CP/M lookalike known as CPN. This holds the most vital commands in ROM so they are there at switch-on, even if no disks are in use. It

also squeezes 400k from a double-sided floppy so I grieved for the loss of both time and file capacity. In practice, to save 'shuffling time', you would write an MS-DOS batch file to load automatically and also copy the essential file (called COMMAND.COM) onto virtually every disk in use, which would immediately absorb 16 or more Kbytes of the (already modest) 360k capacity disks.

Once loaded, disk operations and processing both seemed painfully drawn out. MS-DOS commands are clumsy too: for example, on Torch's Z80 I can change the screen background colour by typing B 2 RETURN whereas in MS-DOS you need COLOUR 0,2 RETURN. BBC users do not always realise that their machine, despite its despised tiny memory, is well-designed and impressively fast. The Graduate is no slower than any IBM PC, but it is nonetheless slow!

So far I have been critical of MS-DOS, but of course it has some capabilities not available in CP/M. There are definite compensations: the facility to 'pipe' output from one program to form the input of another, and the ability to redefine all the keys on the keyboard, are both powerful tools. The file structure is better organised than in CP/M. It grows, like a tree, so that in the main directory (catalogue) you can have sub-directories that can, in turn, themselves contain files or even other sub-directories. This is not of great value on a floppy disk system, where the number of files on a given disk is limited. But on a hard disk, with hundreds of files, it is invaluable. It is possible to hang an IBM-compatible hard disk onto the Graduate.

### Limitations

The important question for would-be buyers is: 'If, to save about £1000, I buy a Graduate instead of an IBM PC, will it really do everything just as well?' The main shortfalls are some modest limitations of the keyboard and larger restrictions on the graphics. The former are easily overcome by simple combinations of keys with SHIFT and CONTROL, and are therefore insignificant. The screen was quite another matter.

The worst loss was of colour for serious applications software. The Graduate inherits the BBC Micro's inability to provide more than black and white in 80-column mode. In the past this was sufficient: serious business users stuck to monochrome because colour screens were too blurred. Although the IBM PC offers 16 colours in 80-column mode, only four of them can be onscreen at any time and users have accepted this. Now, with high-resolution screens at modest cost, all has altered.

I ran Thorn-EMI's exciting new version of Perfect software on both a PC and the Graduate. One of Perfect II's best features is that, when working on multiple texts or spreadsheets (up to 15

spreadsheets can reside in memory at the same time), you can paint each one different colours (both letters and background) which is an enormous aid to avoiding confusion, especially when using a split screen. On the PC they came out in glorious technicolour; on the Graduate only in black and white. (For more on Perfect II, see PCW May.)

The Graduate contains no screen controller; the display is produced by the 6845 video generator chip inside the BBC Micro. The IBM PC uses an identical chip. Its operation is controlled by an address register and a data register in the computer's main memory. However, with the Graduate system, the memory for the BBC's 6502 processor is quite separate from the memory of the 8088 second processor that makes it 'IBM-ish'. Programs such as Microsoft Flight Simulator, which expect to find a 6845 video generator in the memory of the 8088 chip, cannot be run.

But for serious business use, on a monochrome screen, I found little restriction. As well as Perfect II and Xchange I used the Graduate with Lotus 1-2-3 and WordStar, and it worked satisfactorily on them all.

### Conclusion

I envisage two types of buyer: those without and those with a BBC Micro. Are the former likely to go out and buy the BBC and Graduate together? For around the same price they could purchase an IBM clone, such as the Ferranti Advance, which will apparently run anything which runs on the IBM PC, even the screen-related programs such as Flight Simulator. But the Advance comes with Perfect I, which many users find difficult and which has no graphics. A strong reason for buying the Graduate would be to obtain the Xchange suite of software on disk.

I have not discussed Psion's Xchange suite here because it has been fully reviewed in PCW before (October 1984). Let it suffice to say that it is an excellent suite: it's easy to use and very easy to swap data between the different facilities. I know of no other package, at this price, which would combine MS-DOS or equivalent capability with so excellent a suite of applications software.

The existing BBC business user, who wants to expand the power and memory of the BBC and run professional software, is the most likely customer. For him there are three alternatives:

— To buy the Acorn Z80 package, with its rather limited Plan business software, at £400.

— To buy the Torch Z80 with Perfect I software, or with Sage Accounts, for under £300.

— To buy the Graduate, with Xchange, for £1000.

Only those strapped for cash will choose the former options. The latter, offering access to PC software, is much more attractive. **END**





## SCREENTEST

# BCPL

*John Dallman introduces the BCPL language, and gives an overview of its basic contents and usage with the help of comparison Benchmark results for the BBC and QL.*

The imminent arrival on the QL of BCPL makes this an ideal time to reassess Acorn's BBC implementation — and indeed to introduce any unfamiliar readers to the power of one of the first portable programming languages.

BCPL is intended for use in writing 'systems' programs such as assemblers, compilers and operating systems. It was one of the first languages designed for this, and the better-known C language was developed from it.

BCPL is similar to C although much simpler, and forms a good introduction to it while also being rather easier to implement on a micro. Versions are currently available for the BBC Micro, the QL, and for CP/M-80, as well as many mini and mainframe computers. BCPL is highly portable, and programs can generally be run almost unchanged on different machines.

Of the languages widely known among micro users, BCPL most closely resembles Pascal as a structured language used via a compiler rather than an interpreter. It differs, however, from Pascal in one fundamental respect: where Pascal has several 'types' of data (for example, integer numbers, real (floating point) numbers, Booleans (logical values) and character strings) and prevents their mixing, BCPL has only one data type, the word. This is conceptually defined as simply a group of bits, of a size defined by the computer in use. In practice, it occupies several adjacent bytes of memory, and can be considered as a binary number.

Words usually occupy 16, 24 or 32 bits, depending on the computer in use. The contents of a word can be considered as an integer, as a logical value, or as a 'pointer'. As a pointer, the word holds the address of another word or a group of words (a vector). As a pointer can point to other pointers, this allows grouping of data in a manner very

similar to the arrays used in other languages. While the contents of a word can take many meanings, these exist only in the mind of the programmer, and the language does not enforce them or even know of their existence. This almost gives the power of assembly language while retaining the virtues of high-level code.

### Programming

A BCPL program consists of a set of procedures, and starts executing at the procedure START. A very simple BCPL program is therefore:

```
LET start () BE
$(
  LET a,b,c = 3,4,?
  c := a + b
  WRITES("Sum of 3 & 4 is ")
  WRITEN(c)
$)
```

Variables and procedures are both declared with LET, and variables may be given initial values (here, a is given the value 3 and b is 4), or left undefined as c is in its declaration here. The standard library procedures WRITES and WRITEN are used to output strings and numbers. Note that ':= ' is used for assigning a value to c, as opposed to the '=' of Basic. The section brackets '\$(' and '\$)' are used, like 'BEGIN' and 'END' in Pascal, to group commands together.

As well as normal arithmetic, BCPL provides remainder and shift operations such as those found in assembly language. Floating point numbers and operations are not part of the basic language, but are provided as groups of library procedures. BCPL is not intended for number-crunching, and these operations are not usually used in systems programming.

A vector of words can be declared as a variable:

```
LET atoz = VEC 26
```

or, for large vectors, by a library procedure, GETVEC. This requests an area of memory from a memory management system:

```
allchars := GETVEC(255)
```

The variables 'atoz' and 'allchars' in these examples hold the address in memory of the first word in the vector; the individual words are addressed by the indirection operator '!'. This will be familiar to users of BBC Basic and works in just the same way in BCPL, with the meaning 'access the word pointed to by my operands'. For example:

```
atoz!4 := 7
```

puts the value 7 in the fourth element of the vector 'atoz', and

```
allchars!'a' := 1
```

puts 1 into the word in the vector 'allchars' that is indicated by the ASCII code of 'a', the 97th. Data is read out of vectors in the same way:

```
ch.count := allchars!c
```

puts the c'th element, where c is a variable, into the variable 'ch.count'. BCPL will let you PEEK and POKE with '!' anywhere in the computer's memory, not just in vectors, but care must be used to avoid corrupting programs or data.

To test conditions, the IF and TEST statements are used:

```
IF ch = 'A'
```

```
THEN ch := 'a'
```

TEST is used when an ELSE clause is needed:

```
TEST ch < 'a'
```

```
THEN upper.case.chars :=
```

```
  upper.case.chars + 1
```

```
ELSE lower.case.chars :=
```

```
  lower.case.chars + 1
```

Complex tests are allowed, so that:

```
IF 'a' <= ch <= 'z'
```

```
THEN
```

```
$(
```

```
  ch := ch + 'a' - 'A'
```

```
  chars.converted :=
```

```
    chars.converted + 1
```

```
$)
```



```

File s.bm1:
SECTION "MAGNIFIER" // Benchmark 1
GET "TSTHDR" // Declares library
LET START() BE
$(
  LET a = ?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 1

```

File s.bm2:
SECTION "FOR.LOOP" // Benchmark 2
GET "TSTHDR" // Declares library
LET START() BE
$(
  LET a = ?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    FOR count2 = 1 TO 10
    DO
    $(
      a := 0
    $)
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 2

```

File s.bm3:
SECTION "WHILE.LOOP" // Benchmark 3
GET "TSTHDR" // Declares library
LET START() BE
$(
  LET a = ?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    WHILE a < 10
    DO
    $(
      a := a + 1
    $)
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 3

```

File s.bm4:
SECTION "REPEAT.LOOP" // Benchmark 4
GET "TSTHDR" // Declares library
LET START() BE
$(
  LET a = ?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    $(
      a := a + 1
    $)
    REPEATWHILE a <= 10
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 4

would recognise lower-case ASCII characters, convert them to upper case, and keep a count of the number converted.

BCPL also provides a range of structured loop forms which are best illustrated by the Benchmark examples, and a CASE statement.

Character strings are stored in a special fashion in BCPL. They are packed into words, as many bytes in a word as will fit. The words form a vector. The zero'th byte in the string holds the length of the string, and they are therefore normally at most 255 characters long. A variable may be attached to a string:

string.name := "I'm a string"  
and holds the address of the first word of the vector holding the string. Strings are manipulated either by procedures, usually called GETBYTE and PUTBYTE, or by the '%' operator. This is just like the '!' operator, but accesses a vector in terms of bytes rather than words. For example:

```

ch := "another string" % 4
puts the ASCII value of 't' into the
variable ch, as would
string.var := "another string"
ch := string.var % 4
the two pieces of code having exactly
the same effect.

```

Procedures are called by name, followed by a list of parameters in brackets. Like BBC Basic, copies of the values of parameters are passed, but there is no check on the number of parameters passed. Vectors can be passed simply by passing their address, and the address of a simple variable can be passed using the '@' operator which returns the address of its operand. Therefore:

```

a:=@b
!a:=44
puts 44 into b by using the address in a.
Procedures may be called recursively,
and functions may be created.

```

Input and output in BCPL are achieved through procedures which manipulate I/O channels (called streams) in a manner similar to most micros. There is at any time a single input and single output stream in use, although many streams may be used by a program one at a time. Random access filing is not part of the standard language, but a standard form exists for a set of procedures to provide it.

## In use

An important concept in the design of BCPL is a mechanism for linking together sections of a program compiled in several pieces. This is done by means of the 'global vector', a vector provided by the language system rather than being created by the programmer.

This vector holds the start addresses of procedures that have been made global. This is done by declaring the name of the procedure and allocating it a word of the global vector to hold its address, thus;

```

File s.bm5:
SECTION "NO.PARAMETERS" // Benchmark 5
GET "TSTHDR" // Declares library
LET proc1() BE
$(
  RETURN
$)
LET START() BE
$(
  LET a = ?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    proc1()
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 5

```

File s.bm6:
SECTION "ONE.PARAMETER" // Benchmark 6
GET "TSTHDR" // Declares library
LET proc1(param) BE
$(
  RETURN
$)
LET START() BE
$(
  LET a = ?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    proc1(a)
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 6

```

File s.bm7:
SECTION "MANY.PARAMETERS" // Benchmark 7
GET "TSTHDR" // Declares library
LET proc1(a,b,c,d,e,f,g,h,i,j) BE
$(
  RETURN
$)
LET START() BE
$(
  LET a = ?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    proc1(a,a,a,a,a,a,a,a,a,a)
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 7

```

File s.bm8:
SECTION "CONST.TO.STACK" // Benchmark 8
GET "TSTHDR" // Declares library
LET START() BE
$(
  LET a,b = ?,?
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    b := 77
  $)
  WRCH('E')
  WRCH('*N')
$)

```

### Benchmark 8





# SCREENTEST

```
File s.bm9:
SECTION "STACK.TO.STACK" // Benchmark 9
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a,b = ?,?
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    b := 1
    b := a
  $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 9

```
File s.bm10:
SECTION "CONST.TO.STACK.VECTOR" // Benchmark 10
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a,b = ?,?
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    FOR count2 = 0 TO 9
    DO
    $(
      TEST count2 < 5
      THEN a := 0
      ELSE a := 1
    $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 10

```
File s.bm11:
SECTION "CONST.TO.HEAP.VECTOR" // Benchmark 11
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a,b = ?,?
  b := GETVEC(9)
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    FOR count2 = 0 TO 9
    DO
    $(
      b!count2 := 0
    $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 11

```
File s.bm12:
SECTION "IF.TRUE" // Benchmark 12
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a = ?
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    FOR count2 = 0 TO 9
    DO
    $(
      IF count2 < 10
      THEN a := 0
    $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 12

GLOBAL \$(this.procedure: 100 \$) allocates word 100 of the global vector to hold the address of the procedure 'this.procedure'. Procedures from the library supplied with the language are allocated specific words within the global vector, so that the program only has to know which word they are allocated to rather than containing the source code of all the library procedures it needs.

The global declarations required in a program are normally put into a header file, which can be included by the compiler, with the 'GET' directive. The way in which a program indicates which library procedures it needs, and which other sections of the program are required, is dependent on the implementation. The language defines a way of giving a section of program a name with the SECTION directive as illustrated in the Benchmark programs, so that it can be selected from a library itself.

The language is intended to be portable, and this is made easier by the provision of a standard compiler. This is written in BCPL and produces an intermediate code called O-code. To move the language to a new machine from one on which it is already available, it is only necessary to write a back-end for the compiler to generate the appropriate machine code from the O-code, in BCPL. The compiler can then compile a version of itself to run on the new machine. (This route was followed by the implementors of both systems reviewed here).

## Benchmarks

The Benchmark suite featured here was designed to test the major constructs of the language in a similar way to the Basic (January 1985) and Pascal (December 1984) Benchmarks used by PCW. Like the Pascal Benchmarks, they are for 10000 loops. The raw Benchmark figures are strongly influenced by the time for the FOR loop construct, which is a legacy of the original Basic Benchmarks. In both BCPL and Pascal the other loops are used at least as frequently, and more meaningful results can be obtained by subtracting the MAGNIFIER or FOR.LOOP times from other Benchmark values.

In comparing the BBC and QL Benchmark results (Fig 1), it should be noted that the BBC not only has a far less powerful CPU but is running an inter-

```
File s.bm13:
SECTION "IF.FALSE" // Benchmark 13
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a = ?
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    FOR count2 = 0 TO 9
    DO
    $(
      IF count2 > 10
      THEN a := 0
    $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 13

```
File s.bm14:
SECTION "TEST.TRUE" // Benchmark 14
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a = ?
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    FOR count2 = 0 TO 9
    DO
    $(
      TEST count2 < 10
      THEN a := 0
      ELSE a := 1
    $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 14

```
File s.bm15:
SECTION "TEST.MIXED" // Benchmark 15
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a = ?
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := 0
    FOR count2 = 0 TO 9
    DO
    $(
      TEST count2 < 5
      THEN a := 0
      ELSE a := 1
    $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 15

```
File s.bm16:
SECTION "STACK.ARITHMETIC" // Benchmark 16
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a,b = ?,?
  WRCH('S')

  FOR count1 = 1 TO 10000
  DO
  $(
    a := count1 / count1 * b + count1 - count1
  $(
  WRCH('E')
  WRCH('*N')
$(
```

## Benchmark 16



preter, while the QL is running 68008 machine code directly. The BBC's interpreted language is Cintcode, the machine code of an imaginary 16-bit processor optimised for running BCPL, and is similar in essence to Pascal p-Code as used in the UCSD p-System.

The QL is, accordingly, considerably faster, notably in looping and conditional tests. The advantage is less marked in data moves and procedure calls, and surprisingly small in arithmetic. These Benchmarks can be affected

```
File s.bml7:
SECTION "CONST.ARITHMETIC" // Benchmark 17
GET "TSTHDR" // Declares library

LET START() BE
$(
  LET a = 7
  WRCH('S')
  FOR count1 = 1 TO 10000
  DO
  $(
    a := count1 * 2 / 3 + 4 - 5
  $)
  WRCH('E')
  WRCH('N')
$)
```

#### Benchmark 17

by the compiler's ability in optimising, but in the STACK.ARITHMETIC Benchmark, which is most resistant to this, the QL is only 2.5 times faster. Admittedly it is doing 32-bit arithmetic, but there are hardware multiply and divide instructions on the 68008 which should more than restore that disadvantage.

Accessing program sizes is rather difficult, given the different operating systems on the two machines. Differences, rather than absolute sizes, are again more useful. Cintcode is intrinsically more compact than the 68008 instruction set as all the operation codes are one, rather than two, bytes long, and only 16-bit rather than 32-bit addresses and embedded within the code. The code sizes given exclude procedure libraries required to run the programs.

Both compilers include the names of sections and of each procedure in the final code as text strings (10 bytes on the BBC, eight on the QL) for use in debugging. If space is short, they can be compiled out on the BBC.

No figures have been given for compilation times as these depend on the filing system in use. Compiling between Microdrives is very slow, but disks or RAM expansion will improve it. The BBC has no standard disk drive, and there was no point in giving times for my own rather slow system.

## Implementations

### Acornsoft BCPL

This was created by Richards Computer Products Ltd for Acornsoft, and is marketed as a BBC language ROM and a utility disk. The language ROM contains the Cintcode interpreter and a procedure library, while the disk holds the BCPL compiler, two editors, further libraries, debugging utilities, an

assembler and example programs. A front-end environment from which programs may be run and operating system commands used is provided, along with some utility commands, by the language ROM.

The linkage of programs from separately compiled sections is rather unusual. Cintcode is stored in a relocatable form, and is located by the language ROM (and linked to the global vector) when a program is loaded. Consequently, sections are 'linked' by the user who is copying them into the same file without internal changes being made in them. If a few sections are to be extracted from a large library, the NEEDS compiler directive can be used to mark the required sections in the source file, and a utility program (NEEDCIN) supplied with the system can be used to automatically extract them. There is no need to do this for procedures in the language ROM's library as they are automatically available as needed.

As programs are stored in relocatable form, several can be stored in memory at once at different addresses. The BCPL language ROM provides a memory management system that allows this and, in addition, the use of RAM for 'store files', forming a very small silicon disk. This is invaluable when used with the batch file system supplied with the language, which allows compilations and program building to be reduced to single commands.

An assembler, written in BCPL, is provided to allow assembler sub-routines to be easily included where Cintcode is not fast enough. Assembler routines can appear to be BCPL procedures, therefore easing integration.

The debugging utilities supplied are

very complete, providing all the facilities of a first-class machine code monitor, together with tracing and statistics collection for program optimisation. Facilities are also provided for examining the memory management and I/O systems provided by the BCPL ROM. The Cintcode interpreter incorporates 'hooks' for these facilities, and includes low-level error detection for program corruptions, or calls to non-existent procedures.

Several add-on packages are avail-

*'BCPL is intended for use in writing 'systems' programs such as assemblers, compilers and operating systems. It was one of the first languages designed for this and the better known C language was developed from it.'*

able for this implementation. They include a stand-alone system, which provides the Cintcode interpreter and libraries to allow programs to run without the BCPL ROM. This provides facilities for packaging BCPL programs as language and utility ROMs, as well as disk or cassette-based programs. A floating point procedure set and random access filing procedures are also available.

The system works with the 6502 second processor, taking advantage of the additional memory. Disks or Econet are required to use the system effec-

Benchmark	Time (sec)		Code (bytes)	
	BBC	QL	BBC	QL
Magnifier	5.1	0.4	62	112
For loop	54.7	5.1	74	136
While loop	44.7	3.2	70	124
Repeat loop	39.3	3.3	68	120
No parameters	8.5	1.6	76	132
One parameter	9.1	1.7	78	132
Many parameters	14.7	2.6	88	164
Const to stack	6.3	0.6	64	116
Stack to stack	7.3	0.75	66	120
Const to stack vector	61.6	7.6	84	156
Const to heap vector	64.7	7.6	78	160
If true	72.3	6.8	78	144
If false	64.6	5.6	78	144
Test true	80.2	6.5	82	152
Test mixed	76.9	6.9	82	152
Stack arithmetic	18.2	5.6	70	152
Const arithmetic	17.4	5.4	70	140
Mean	40.0	4.2		

Times are means of 10 runs, timed by stopwatch

BBC: standard BBC B, code sizes are disk file sizes. Acornsoft/RCP BCPL, 16-bit word, compiler version 2.2, ROM version 7.0.

QL: Sinclair QL, code sizes are as reported by linker as QDOS will not give accurate file sizes. Metacomco BCPL, 32-bit word, pre-release version.

Fig 1 Comparison BCPL Benchmark results for the BBC and the QL





## BUSINESS RISK ANALYSIS

# HEADS TAILS OR...

# ...OPTIONS?

OPTIONS takes over where your spreadsheet leaves off! Produces a thousand 'what if' results in seconds! OPTIONS picks you up where a spreadsheet lets you down. It's like no other program currently available.

Picture the scene. You've painstakingly set up a business model on your spreadsheet. All the facts and figures are there and everything looks perfect. Then the inevitable happens. The 'what if' questions start coming thick and fast.

'What if' sales vary by 8%? 'What if' material costs increase by 10%? 'What if' the unions push us into an extra 7%? 'What if' oil costs vary by 5%? 'What if' interest rates vary by 2%? 'What if' our selling costs increase by 10%? etc. etc.

And 'what if' you had a program which applied all these variables to your model and cash-flow forecast **and gave you all the answers in seconds.** Not just a single answer but the whole range of risk possibilities. Show you both numerically and graphically, the chances of achieving varying degrees of success and failure - profit and loss - related to the variables you apply. The kind of information you need to plan your business and bank managers just love to see!

OPTIONS is that program. A new concept in business risk analysis. No other program does the job with such speed, flexibility, and accuracy. OPTIONS allows you to take a model

created on your favourite spreadsheet Lotus 1-2-3, Multiplan or Supercalc and manipulate it in this powerful new way. If you have no spreadsheet no problem! OPTIONS has its own. For only £145 + VAT you can have all the answers to every 'what if' question they can throw at you. Instantaneously!

**£145** + VAT

**SAGE OPTIONS™**

Please send me more details of Sage OPTIONS and my nearest dealer.

Name: \_\_\_\_\_ Position: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Tel: \_\_\_\_\_

I have a ( \_\_\_\_\_ ) Computer

Sagesoft Limited, NEI House, Regent Centre, Newcastle upon Tyne NE3 3DS.

Tel: 091 284 7077. Telex: 53623 SAGESL G.

**BETTER SAGE THAN SORRY**

PCW 6-85





## SCREENTEST

tively unlike the QL.

The documentation supplied does not teach BCPL, but it describes the system supplied very thoroughly and legibly. Some unusual library procedures provided with the system include: MOVE, a fast memory block move; RDARGS, a command-line interpreter; and calls to the memory management system to enable programs to use store files easily. Multi-tasking is not provided, but the BCPL extension for 'coroutines' is. This allows a program to readily swap between two tasks.

A Cintcode BCPL is also available from Richards Computer Products for CP/M systems. Compiled Cintcode programs are interchangeable between the two systems, provided only the library procedures available on both are used.

### Metacomco BCPL for the QL

This is very similar to the BBC implementation, within the constraints of the two machines. The portable BCPL compiler was the starting point for both systems, and the same screen editor is provided with both packages. This editor is written in BCPL; it is intended for use in programming rather than word processing, and is excellent for the job. It has recently been adopted by Sinclair as the standard QL editor for software development.

Unlike Acornsoft BCPL, which provides a programming environment, this implementation works within the machine operating system, QDOS, generating 68008 machine code programs in a form that can use QDOS multi-tasking properly. This is a very simple way of exploiting the power of

the QL in a way that QL SuperBasic fails to do. The usefulness of the system is well-illustrated by the fact that Metacomco's assembler, Lisp and Pascal packages have been written with it.

The package is supplied on Micro-

*'The language is intended to be portable, and this is made easier by the provision of a standard compiler. This is written in BCPL and produces an intermediate code called O-code.'*

drive, containing the compiler, editor and a linker. This is much more of a bare-bones implementation than the BBC implementation, and lacks the other system's plethora of utilities. The one important lack is debugging facilities, although of course any QL debugger may be used on the machine code produced by the system. It seems intended as a part of a software production system, rather than a sys-

tem on its own.

It is compatible with the Metacomco assembler, and linking code produced by the two is simple. A notable advantage over the use of assembler within the BBC system is that BCPL routines, notably the input and output procedures, may be called from within the code written in assembly language.

Memory management is provided by QDOS, which allows SuperBasic programs to co-exist with BCPL code, and to be used as a batch command system.

The draft documentation I've seen is not as massive as that on the Acorn system, but perfectly adequate. The library includes floating point and random access filing extensions, rather than these being provided as add-ons at extra cost.

### Conclusion

Simply comparing the two language packages is impossible, as the machines they run on are so different. Both form very powerful development systems for systems software, and seem quite robust.

The packages have considerable potential to be used together, with program modules being written on a BBC machine, and tested there, being able to use disk, as opposed to Microdrive, storage and the Cintcode debugger. When operational, they can be transferred to a QL by the RS232 serial link and re-compiled there. Some work needs to be done building compatible graphics libraries for the two machines, but procedures to access the operating system functions are adequate in both systems to do this.

### BCPL products

#### Books

The definitive book on BCPL is *BCPL — the language and its compiler*, by Martin Richards and Colin Whitby-Stevens, published by Cambridge University Press. It is also accessible to anyone with a basic knowledge of programming, and is highly recommended. Acornsoft is to produce an introductory book, *Beginning BCPL on the BBC Microcomputer*.

#### Software

For the BBC/Acorn from Acornsoft, (0223) 216039: BCPL language system, (ROM, disk and manual), £59.80; manual separately, £15.00; BCPL stand-alone system (allows programs to run without ROM), £49.90; BCPL calculations pack (high-precision floating and fixed point maths), £19.90.

For the Sinclair QL from Metacomco, (0272) 428781: BCPL language system (Microdrive cartridge and manual), £59.90.

END

Thanks to Richards Computer Products Ltd and Metacomco Ltd for their help and advice with the writing of this article.



'My God Atkinson! I think it says computer room.'



# Getting together

*There's more than one way to interface a BBC Micro and an Apple, but in this method only one piece of additional hardware is needed — a connecting lead. Gavin Haines explains.*

If you already own one micro, you need a good excuse to buy another. When the Apple first appeared it only had a 40-column screen and no lower case. The BBC Micro by contrast has 80 columns, upper and lower case, as well as high-resolution graphics.

You can buy an additional graphics processor and 80-column boards for the Apple, but these can easily cost as much as a BBC Micro. Why not buy a BBC Micro and use it as a graphics and

80-column terminal? Your Apple can also be your BBC Micro's second processor.

There isn't anything new in the idea of the second processor: there are numerous additional circuit boards available for machines such as the Apple and IBM PC. On the BBC Micro, the second processors come in a separate box. The only disadvantage of owning a 'second micro' as opposed to a 'second processor' is that you will have two keyboards,

which is a more visible extravagance and is harder to justify than a plug-in circuit board.

When you have accepted that the idea of owning two machines is not so bad, possibilities begin to suggest themselves. As the BBC Micro and the Apple are both 6502 machines, you immediately have cross-assembler facilities. With the DOS toolkit assembler, for example, you can create a source file of 1000 to 1500 fully-commented lines. This is about 30k, compared to 32k total RAM on the BBC Micro.

You can implement multi-tasking: while your assembler listing is being printed, you can continue working on the other machine. Another bonus is that BBC programs can be saved to Apple disks. (These considerations could apply to any two machines.)

## Interfacing options

When you have your BBC Micro, how do you go about hooking it up to the Apple? There are several alternatives. The easiest (and most expensive) option is to buy a network adaptor for each machine. The software is already written, and you have your own private network to experiment with.

The next option is to buy an RS232 communications interface card for the Apple. The BBC Micro already has an RS232 interface, so you only need additional hardware at the Apple end.

However, an additional card is a further expense which uses up another slot in the Apple. How can you interface an Apple to a BBC Micro without using extra hardware?

The BBC Micro has a 6522 VIA (versatile interface adaptor) configured as a user port; the Apple has a games paddle socket. The sockets on both machines provide input and output lines at TTL (transistor-transistor logic) levels — about 5 volts. All you need to interface the two machines is a length of insulation displacement cable and software. The wiring arrangement is shown in Fig 1.

The old Apple reference manual, *The Red Book*, contains a program to drive a teletype via the games paddle socket. This suggests a possible solution: each computer could treat the other as if it were a printer, with similar programs at

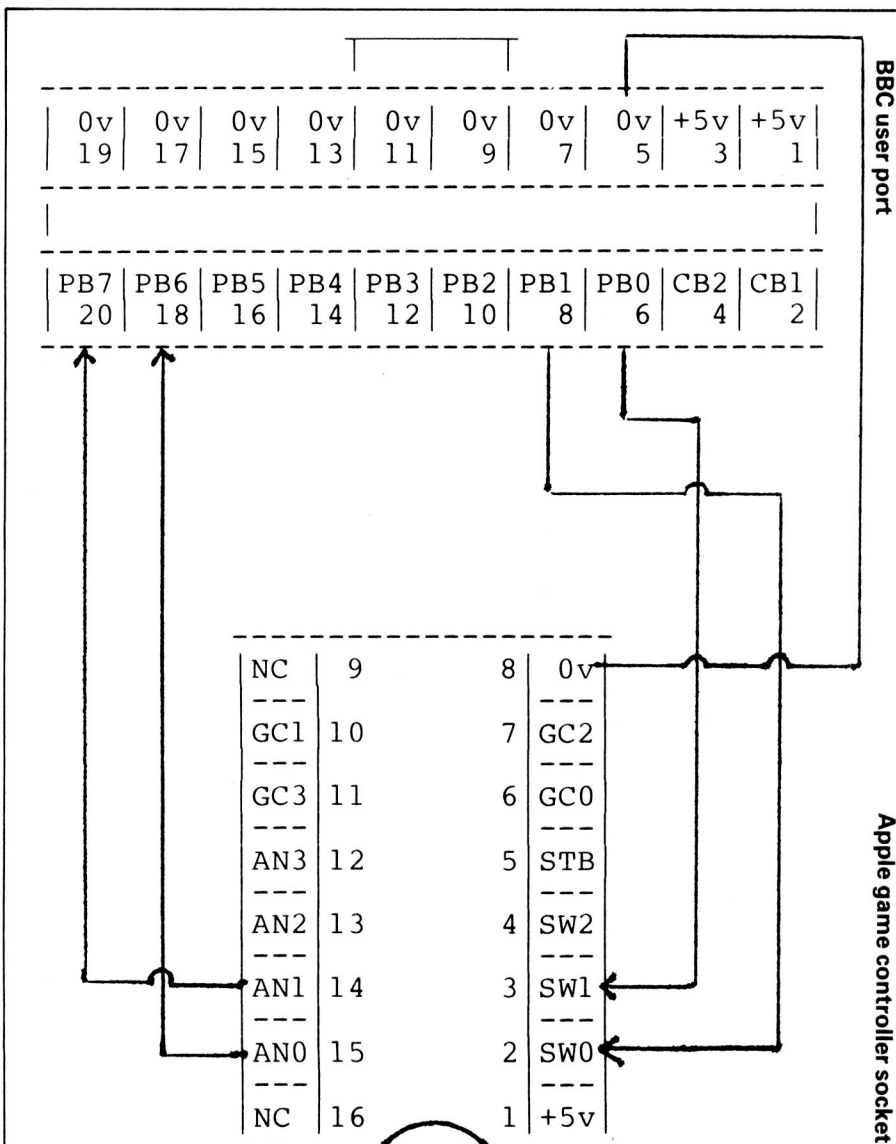
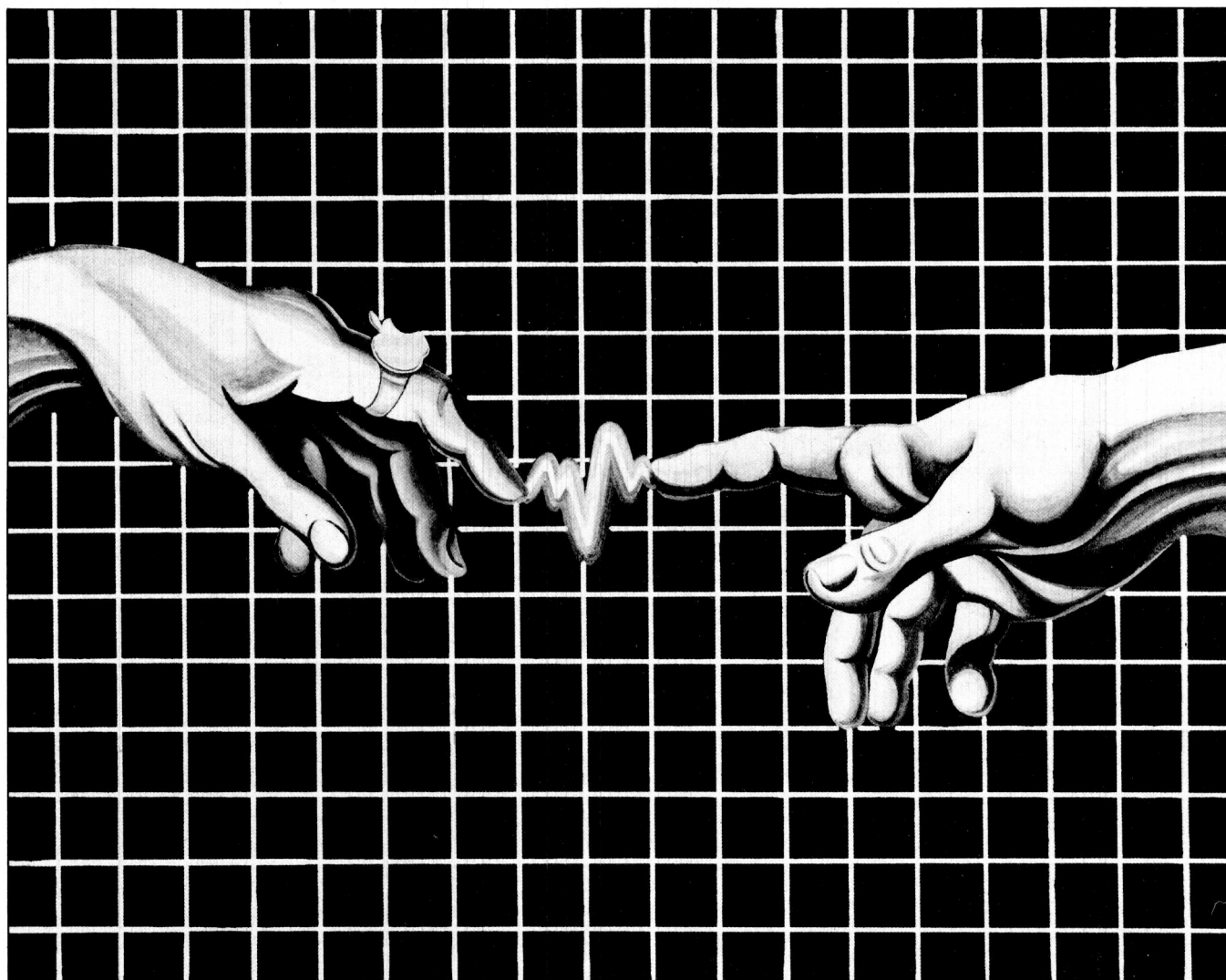


Fig 1 The wiring arrangement





both ends.

The Apple games paddle socket has three push-button inputs — SW0, SW1 and SW2 (see Fig 1). When you press the button on your paddle, the line goes high. There are four games controller inputs called GC0, GC1, GC2 and GC3; these are used to measure changes in voltage when you turn your paddle, and can be dismissed from consideration as data inputs. Next, there are four output 'annunciators' — AN0, AN1, AN2 and AN3. So, there is the possibility of using four outputs and three inputs.

Most interface circuits work at a fixed baud rate, with zeros and ones transmitted at certain voltages. Such interfaces are easily implemented with a few ICs (integrated circuits), but if your skills are more in the software direction you can create an interface which does not cost anything.

If you hold an Apple games paddle in each hand, you can transmit bytes to the machine by depressing the buttons in a certain sequence — get the other machine to do the button-pushing and you've got your interface. You could, of course, use any transmission code, but it makes sense to use ASCII. It's possible to transmit text files with a seven-bit code, but it's wiser to use eight bits.

You can transmit data from the Apple by toggling the annunciators. However, at this point you can run into difficulties.

Firstly, the information given in the Apple II reference manual is incorrect. This is the actual position:

#### Annunciators

		Decimal	Hex
AN0	OFF	49241	C059
	ON	49240	C058
AN1	OFF	49243	C05B
	ON	49242	C05A
AN2	OFF	49245	C05D
	ON	49244	C05C
AN3	OFF	49247	C05F
	ON	49246	C05E

#### Inputs

PB0	49249	C061
PB1	42950	C062

You can change the setting of the annunciator soft switches by executing any instruction which merely reads these locations. This has several consequences, the main one being that it is possible to determine the setting of a given line by software. You can only keep a record of the state of the switch somewhere else in the program.

There is another snare with the 6502 itself. An indexed instruction which crosses a page boundary generates a false read. Unlike the writers of BBC Basic, the authors of Applesoft (Apple Floating Point) Basic used many inde-

xed loops. Also, there are some instances where a page boundary is crossed; the most annoying occurs with the CHR\$ function, as it generates a false read in the region C000-CFFF (hex). This is the area of the Apple's memory-mapped I/O.

The false read can toggle the annunciators and mess up your interface, so you must be prepared for everything to go dead once in a while.

There are three answers to this. The first is to include error checking and error recovery software, the second is to put up with it. The third is to fit a CMOS 6502 (which does not have this problem) to your Apple. The Rockwell 2MHz version does work, at least in the Apple: it doesn't work in some BBC Micros. The Acorn 6502 second processor is fitted with the GTE 3MHz version.

At the BBC end of the interface, the Model B is fitted with a 6522 VIA. This contains 16-bit interval timers, serial to parallel shift registers, and it can also be programmed to cause an interrupt. But, since there is no equivalent hardware at the Apple end, you don't need to use all these facilities.

The VIA B (that is, the user VIA) is used to provide the BBC Micro user port. There are eight data lines, PB0 to PB7, and two handshake lines, CB1 and CB2. As the Apple does not have facilities for handling interrupts, CB1 and CB2, the





# COMPUTER WAREHOUSE

1000's OF  
BARGAINS  
FOR CALLERS

THE 'ALADDIN'S' CAVE OF COMPUTER AND ELECTRONIC EQUIPMENT

## RECHARGEABLE BATTERIES

Dry Fit Maintenance FREE by Sonnenschein.  
A300 07191315 12v 3 AH same as RS 591-770 NEW  
£13.95 A300 07191202 6-0-6 1.8 AH same as RS 591-  
382 EX EQUIP £4.99 Miniature PCB mount 3.6v 100  
Mah as RS 591-477 NEW £1.00 SAFT VR2C 1.2v "C"  
size NICADS in 18 cell ex equipment pack. Good condition  
- easily split to single cells £10.50 + pp £1.90

## EX-STOCK INTEGRATED CIRCUITS

2732 ex equip £3.25, 27128 - 250ns NEW £12.00.  
6116-200 £4.50 6116-250 £3.95  
6264LP-150 £22.00, 4164-200 £3.50, 4864-150 £4.00,  
4116-300, £1.20, 2114 £1.75, 6800 £2.50, 6821 £1.00,  
68A09 £8.00, 68B09 £10.00, 68B09E £14.50,  
DB085AH-2 £12.00, DB086 £20.00, Z80A £2.99.

## COOLING FANS

Keep your hot parts COOL and RELIABLE  
with our range of BRAND NEW professional  
cooling fans.  
ETRI 60XUOL Dim. 92 x 92 x 25 mm.  
Miniature 240 v equipment fan complete with  
finger guard. £9.95  
GOULD JB-3AR Dim. 3" x 3" x 2.5" compact  
very quiet running 240 v operation. NEW £6.95  
BUHLER 69.11.22. 8-16 v DC micro  
miniature reversible fan. Uses a brushless  
servo motor for extremely high air flow,  
almost silent running and guaranteed 10,000  
hr life. Measures only 62 x 62 x 22 mm.  
Current cost £32.00 OUR PRICE ONLY  
£12.95 complete with data.  
MUFFIN-CENTAUR standard 4" x 4" x 1.25"  
fan supplied tested EX EQUIPMENT 240 v at  
£6.25 or 110 v at £4.95 or BRAND NEW 240 v  
at £10.50. 1000's of other fans Ex Stock.  
Call for Details. Post & Packing on all fans £1.60

## BUDGET RANGE VIDEO MONITORS

At a price YOU can afford, our range of EX  
EQUIPMENT video monitors defy  
competition! All are for 240v working with  
standard composite video input. Units are  
pre tested and set for up to 80 col use on  
BBC micro. Even where MINOR screen  
burns MAY exist - normal data displays are  
unaffected.

**1000's SOLD TO DATE**  
12" KGM 320-321, high bandwidth input.  
will display up to 132 columns x 25 lines.  
Housed in attractive fully enclosed  
brushed alloy case. B/W only £32.95  
24" KGM large screen black & white  
monitor fully enclosed in light alloy case.  
Ideal schools, shops, clubs etc.  
**ONLY £55.00** Carriage £10.00

## DATA MODEMS

Join the communications revolution with  
our super range of DATA MODEMS with  
prices and types to suit all applications  
and budgets!  
Most models are EX BRITISH  
TELECOM and are made to the highest  
standard for continuous use and reliability.  
RS232C interfaces are standard to all our  
modems, so will connect to ANY micro etc.  
with an RS232C serial interface.

**DATL 2B** see SPECIAL OFFER centre of  
this ad.  
**MODEM 13A**, 300 baud. Compact unit only  
2" high and same size as telephone base.  
Standard CCITT tones. CALL mode only.  
Tested with data. **ONLY £45.00 + pp £4.50.**  
**MODEM 20-1**, 75-1200 baud. Compact unit  
for use as subscriber end to PRESTEL  
MICRONET or TELECOM GOLD. Tested with  
data. **£39.95 + pp £6.50.**  
**MODEM 20-2**, same as 20-1 but 1200-75  
baud **£99.00.**  
**TRANSDATA 307A**, 300 baud acoustic  
coupler. Brand new with RS232C interface.  
**ONLY £49.95**  
**DACOM DSL2123** Multi Standard Modem,  
switchable CCITT or USA BELL 103 standard.  
V21 300-300, V23 75-1200, V23 1200-75 or  
1200-1200 half duplex.  
Auto answer via MODEM or CPU. CALL or  
ANSWER modes plus LED status indication.  
Dim 2.5" x 8.5" x 9" **BRAND NEW fully**  
**guaranteed ONLY £268.00 + pp £4.50.**  
**DATL 2412** Made by SE LABS for BT this  
two part unit is for synchronous data links at  
1200 or 2400 baud using 2780/3780  
protocol. Many features include Auto answer,  
2 or 4 wire working etc. etc. **COST OVER**  
**£800. OUR PRICE £185.00.**  
**DATL 4800**, RACAL MPS4800 high speed  
good condition **£285.00 CARR £10.00**

## HOT LINE DATA BASE

# DISTEL ©

THE ORIGINAL FREE OF CHARGE dial up data base  
1000's of stock items and one off bargains  
ON LINE NOW - 300 baud, full duplex CCITT tones, 8 bit  
word, no parity

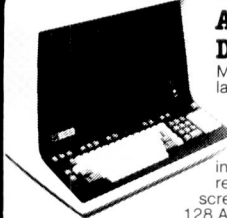
**01-679 1888**

## MAINS FILTERS

Cure those unnerving hangups and data glitches caused  
by mains interference.  
SD5A As recommended by ZX81 news letter, matchbox  
size up to 1000 watt load **£5.95**  
L2127 compact completely cased unit with 3 pin fitted  
socket Up to 750 watts **£9.99**

## Anderson Jacobson

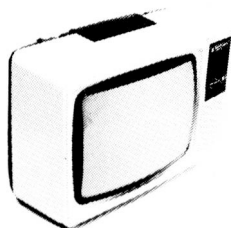
### AJ510 VIDEO DISPLAY TERMINAL



Made by one of the USA's  
largest peripheral manufacturers  
the AJ510 Professional VDU  
terminal has too many  
features to include in space  
available - just a few are:  
internal Z80 cpu control, very  
readable 15" non glare green  
screen, 24 lines by 80 characters,  
128 ASCII character set with lower  
case and graphics, standard RS232C interface, Cursor  
addressing, numeric key pad etc. Supplied in good  
**TESTED** second hand condition with full manual  
**£225.00 + carr £10.00.** Data sheet on request.

A Major company's over production problems, and a special  
BULK PURCHASE enable TWO outstanding offers.

## COLOUR MONITOR SPECIALS



### 'SYSTEM ALPHA' 14" Multi Input Monitor.

Made in the UK by the famous REDIFFUSION Co. for their own professional  
computer system this monitor has all the features to suit your immediate and future  
monitor requirements. Two types of video input, RGB and PAL Composite Video,  
allow direct connection to most makes of micro computers and VCR's. An internal  
speaker and audio amplifier may be connected to your system's output or direct to  
a VCR machine, giving superior colour and sound quality. Many other features  
include PIL tube, Matching BBC case colour, Major controls on front panel,  
Separate Contrast and Brightness - even in RGB mode, Two types of audio input,  
Separate Colour and audio controls for Composite Video input, BNC plug for  
composite input, 15 way 'D' plug for RGB input, modular construction etc. etc.

This must be ONE OF THE YEAR'S BEST BUYS!!!  
Supplied **BRAND NEW** and **BOXED**, complete with **DATA** and 90 day guarantee.  
**SUPPLIED BELOW ACTUAL COST - ONLY £149.00 + Carr.**

### DECCA RGB 80-100 Monitor.

Little or hardly used manufacturer's surplus enables us to offer this special  
converted DECCA RGB Colour Video TV Monitor at a super low price of only  
**£99.00**, a price for a colour monitor as yet unheard of! Our own interface, safety  
modification and special 16" high definition PIL tube, combine with the tried and  
tested DECCA 80/100 series chassis to give 80 column definition and picture  
quality found only on monitors costing 3 TIMES OUR PRICE. In fact, **WE**  
**GUARANTEE** you will be delighted with this product, the quality for the price has to  
be seen to be believed. Supplied complete and ready to plug direct to a BBC  
MICRO computer or any other system with a TTL RGB output. Other features  
include internal audio amp and speaker, Modular construction, auto degaussing  
34 H x 24 D, 90 day guarantee. Supplied in **EXCELLENT** condition, **ONLY £99.00**  
+ Carr. Also available **UN-MODIFIED** but complete with MOD DATA. Only £75.00.  
Carriage and Insurance on monitors £10.00

## SPECIAL 300 BAUD MODEM OFFER

Another GIGANTIC purchase of these EX BRITISH TELECOM, BRAND  
NEW or little used 2B data modems allows US to make the FINAL  
REDUCTION, and for YOU to join the exciting world of data  
communications at an UNHEARD OF PRICE OF ONLY £29.95. Made to  
the highest POST OFFICE APPROVED spec at a cost of hundreds of  
pounds each, the 2B has all the standard requirements for data base,  
business or hobby communications. All this and more!!

- 300 baud full duplex
- Full remote control
- CCITT tone standards
- Supplied with full data
- Modular construction
- Direct isolated connection
- CALL, ANSWER and AUTO modes
- Standard RS232C serial interface
- Built in test switching
- 240v Mains operation
- 1 year full guarantee
- Just 2 wires to comms. line

**NOW ONLY  
£29.95**

Order now - while stocks last. Carriage and Ins. £10.00

## SAVE £250 SUPER PRINTER SCOOP



**BRAND NEW  
CENTRONICS  
739-2**

**ONLY  
£199**

The "Do Everything Printer" at a price that will  
**NEVER** be repeated. Standard CENTRONICS  
parallel interface for direct connection to BBC,  
ORIC, DRAGON etc. Superb print quality with full  
pin addressable graphics and 4 type fonts plus  
**HIGH DEFINITION** internal PROPORTIONAL SPACED  
MODE for WORD PROCESSOR applications. 80-132  
columns, single sheet, sprocket or roll paper handling plus  
much more. Available **ONLY** from **DISPLAY ELECTRONICS**  
at the ridiculous price of **ONLY £199.00 + VAT** complete with  
full manual etc. Limited quantity - Hurry while stocks last.  
Options: Interface cable (specify) for BBC, ORIC,  
DRAGON or CENTRONICS 36 way pig £12.50 Spare ribbon  
£3.50 each BBC graphics screen dump utility program £8.60  
Carriage and Ins. £10.00 + VAT

## HUNDREDS OF PRINTERS

**EX STOCK FROM £49.00.** Call Sales Office for Details.

1 only large CALCOMP 1036 AO 3 pen drum plotter and  
offline 915 magtape controller. Good working order.

**ADD VAT TO ALL PRICES £2500.00.**

EX STOCK

## DEC CORNER

PDP 1140 System comprising of CPU,  
124K memory + MMU 16 line RS232C  
interface, RP02 40 MB hard disk drive,  
TU10 9 track 800 BPI Mag tape drive, dual  
rack system, VT52 VDU etc. etc. Tested  
and running **£3750.00**

- BA11-MB 3.5" Box, PSU, LTC **£385.00**
- DH11-AD 16 x RS232C DMA  
interface **£2100.00**
- DLV11-J 4 x EIA interface **£310.00**
- DLVII-E Serial. Modem support **£200.00**
- DUP11 Sych. Serial data i/o **£650.00**
- DQ200 Dialog - multi RK  
controller **£495.00**
- DZ11-B 8 line RS232C mux board **£650.00**
- KDF11-B M8189 PDP11 123+ **£1100.00**
- LAX36 Decwriter EIA or 20 ma loop **£270.00**
- LAX34-AL LAX34 tractor feed **£85.00**
- MS11-JP Unibus 32 kb Ram **£80.00**
- MS11-LB Unibus 128 kb Ram **£450.00**
- MS11-LD Unibus 256 kb Ram **£850.00**
- MSC4804 Qbus (equiv MSV11-L)  
256 kb **£499.00**
- PDP11/05 Cpu, Ram, i/o, etc. **£450.00**
- PDP11/40 Cpu, 124k MMU **£1850.00**
- RT11 ver. 3B documentation kit **£70.00**
- RK05-J 2.5 Mb disk drives **£650.00**
- KL8JA PDP 8 async i/o **£175.00**
- M8E PDP 8 Bootstrp option **£75.00**
- VT50 VDU and Keyboard -  
current loop **£175.00**
- VT52 VDU with RS232C interface **£250.00**

1000's of EX STOCK spares for DEC  
PDP8, PDP8A, PDP11 systems &  
peripherals. Call for details. All types of  
Computer equipment and spares wanted  
for PROMPT CASH PAYMENT.

# DISPLAY ELECTRONICS

All prices quoted are for U.K. Mainland, paid cash with order in Pounds Sterling PLUS VAT. Minimum order value **£2.00**.  
Minimum Credit Card order **£10.00**. Minimum BONA FIDE account orders from Government Depts., Schools, Universities and  
established companies **£20.00**. Where post and packing not indicated please ADD **£1.00 + VAT**. Warehouse open Mon-Fri  
9.30-5.30. Sat 10.00-5.30. We reserve the right to change prices and specifications without notice. Trade, Bulk and Export

32 Biggin Way, Upper Norwood, London SE19 3XF  
Telephone 01-679 4414 Telex 894502 Data 01-679 1888





# PROJECTS

```

ASM
1  * BEEB 1.4
2  *
3  * BBC TO APPLE INTERFACE SUBROUTINE
4  * LAST UPDATED 23/JUL/1983
5  * ENTRY POINT: $300
6  * WRITTEN BY GAVIN HAINES
7  * BIG MAC ASSEMBLER
8  *   ORG $300
9  * ZERO PAGE LOCATIONS
10 WORD = $FA
11 *
12 * APPLE ROUTINES
13 KBD = $C000
14 KBDSTB = $C010
15 SETANI = $C05A
16 CLRANI = $C05B
17 SW0 = $C061
18 SW1 = $C062
19 COUT = $FDED
20 HOME = $FPC58
0300: 20 58 FC 21 JSR HOME
0303: A9 80 22 LDA #80 ;MASK FOR BIT 7
0305: 8D 5B 03 23 STA FLAG
0308: 2C 61 C0 24 BIT SW0 ;IS LINE HIGH?
030B: 10 4A 25 BPL EXIT ;EXIT IF IT IS.
030D: 2C 5B C0 26 BIT CLRANI ;PULL LINE LOW
0310: A2 08 27 RDBYTE LDX #8 ;8 BITS TO READ
0312: AD 00 C0 28 READY LDA KBD ;READ KEYBOARD
0315: C9 80 29 CMP #80 ;KEY PRESSED?
0317: B0 37 30 BCS KEYIN ;YES BRANCH
0319: AD 61 C0 31 LDA SW0 ;READ HANDSHAKE LINE
031C: 4D 5B 03 32 EOR FLAG ;CHANGED STATE?
031F: 10 F1 33 BPL READY ;NO, BRANCH
0321: AD 61 C0 34 LDA SW0 ;SAVE STATUS OF HANDSHAKE
;LINE
0324: 8D 5B 03 35 STA FLAG
0327: 0A 36 ASL A ;SHIFT BIT INTO CARRY
0328: 90 05 37 BCC AN1ON ;SEND A ONE IF CARRY CLEAR
032A: 2C 5B C0 38 BIT CLRANI ;SEND A ZERO IF NOT
032D: B0 03 39 BCS RDBIT ;AVOID RESETING AN1 BY DEFAULT
032F: 2C 5A C0 40 AN1ON BIT SETANI
41 *
0332: AD 62 C0 42 RDBIT LDA SW1 ;DATA LINE
0335: C9 80 43 CMP #80 ;SET CARRY FLAG
0337: 26 FA 44 ROL WORD ;SHIFT CARRY INTO BYTE
0339: CA 45 DEX
033A: D0 D6 46 BNE READY ;BRANCH UNTIL XREG=0
033C: A5 FA 47 LDA WORD ;BYTE CREATED
033E: 09 80 48 ORA #80 ;WE DON'T WANT FLASHING CHARACTERS
0340: C9 97 49 CMP #97 ;IS IT END MARKER (CTRL-W)
0342: F0 13 50 BEQ EXIT ;BRANCH IF IT IS
0344: C9 8A 51 CMP #8A ;CTRL-J?
0346: F0 C8 52 BEQ RDBYTE ;YES, THEN SKIP IT
0348: 20 ED FD 53 JSR COUT ;CURRENT OUTPUT DEVICE
034B: 4C 10 03 54 JMP RDBYTE
034E: F0 07 55 BEQ EXIT ;ALWAYS TAKEN
0350: 2C 10 C0 56 KEYIN BIT KBDSTB ;MUST CLEAR STROBE
0353: C9 9B 57 CMP #9B ;ESC?
0355: D0 BB 58 BNE READY
0357: 2C 5A C0 59 EXIT BIT SETANI
035A: 60 60 RTS
61 FLAG DS 1
62 ***** END OF PROGRAM

--End assembly--

92 bytes

Errors: 0

Symbol table - alphabetical order:

AN1ON = $032F    CLRANI = $C05B    COUT = $FDED    EXIT = $0357
FLAG = $035B    HOME = $FPC58    KBD = $C000    KBDSTB = $C010
KEYIN = $0350   RDBIT = $0332    RDBYTE = $0310  READY = $0312
SETANI = $C05A   SW0 = $C061     SW1 = $C062    WORD = $FA

Symbol table - numerical order:

WORD = $FA      RDBYTE = $0310    READY = $0312    AN1ON = $032F
RDBIT = $0332   KEYIN = $0350     EXIT = $0357     FLAG = $035B
KBD = $C000     KBDSTB = $C010   SETANI = $C05A   CLRANI = $C05B
SW0 = $C061     SW1 = $C062     HOME = $FPC58    COUT = $FDED

```

Fig 2 BBC to Apple interface subroutine

programs do not use them. How do you get the interface to work?

## In use

The easiest solution is to initialise both the Apple and the BBC Micro to a known state, and then send a signal byte — all ones, all zeros. Once the other machine

knows which bit is the first bit of the first byte, all the other bytes follow in sequence. But if something goes wrong in this process, you get gibberish on the screen. To keep it simple, the software assumes that the BBC Micro is calling the Apple, and you have to run the BBC program first.

The BBC Micro user port is located at &FE60. The data direction register (DDR) is at &FE62. To designate a line as an output, you store a corresponding 1 in the DDR (there is an example in the user guide, pages 468-9). But like the Apple reference manual, the BBC Micro user guide is slightly misleading. It implies that all code routines must be written so that they will work over the 'tube', but using OSBYTE routines to write to SHEILA as the user guide suggests is very complicated, and execution time is considerably increased. Furthermore, a program which is running in the second processor cannot service interrupts generated by devices connected to the BBC Micro, and OS calls inside an event are not permitted. Programming across the tube is difficult, as Acorn found out.

In short, you may decide that it's more trouble than it's worth to make your software tube-compatible. Even if you have got a second processor, you can always switch it off and revert to using the BBC Micro as a 32k machine for user-interfacing applications.

The BBC Micro has a series of vectors in page two which act like a signal box. A railway has basically two tracks, the up line and the down line, input and output. The signalman can arrange for a train arriving on any line to arrive at any platform by changing the vectors. By intercepting the output stream, OSWRCH, you can easily make data go to another machine.

Having trapped the output vector, all characters will pass through your machine code routine; you then serialise each byte and transmit it. Line PB7 is directly testable with the negative flag (line PB6 can also be directly tested with the V flag).

The interface uses just five wires: two clock lines, two data lines, and a common return. Every time one machine wants to send a bit, it changes the state of the clock line. The other machine then changes its clock line in response, and so on.

To implement the interface, you would make up a lead as shown in Fig 1. The BBC program (Fig 3) can be entered directly. You can enter the Apple program as shown (Fig 2) if you have an assembler, otherwise you will have to enter the hex data into the monitor. For example:

```

CALL-151<cr>
300:20 58 FC
303:AD 61 C0, and so on
FP <cr>
BSAVE BBC Micro 1.0, A$300, L$5B
<cr>

```

The Big Mac assembler is a worthwhile investment. The BBC program has been written to receive and transmit data; the Apple machine language routine will only receive data. (Unfortunately, the complete package is too



# Lone yachtsman all at sea, bailed out by expert crew

Mr. Howard was in the middle of the Indian Ocean when the computer on board his yacht developed a fault. Undeterred by the thousands of miles between him and England, he knew that Fraser Associates were the only people to deal with the problem.

Without hesitation he sailed to Sri Lanka, flew to Heathrow, hired a car and took the faulty machine to Fraser's where, in just two hours, the computer was restored to full working order.

Fraser Associates pride themselves that selling a computer is only the start of a relationship. Our customers, now numbering well over a thousand, can look forward to a service virtually unrivalled by any other dealer.



## FREE SOFTWARE & TRAINING WITH EVERY SYSTEM.

Phone (0280) 816087 for more information.

- Impartial advice from trained consultants.
- On site training.
- On site servicing & fully equipped workshops.
- Complete After Sales telephone support.

Bristle Hill, Buckingham MK18 1EZ Telephone (0280) 816087

 **SANYO**



**EPSON**

Authorised  
Sales & Service  
Centre



# PROJECTS

```

>L.
10 REM *****
20 REM * APPLE8: BBC to Apple *
30 REM * interface program. *
40 REM * *
50 REM *
60 REM * Sends data through *
70 REM * BBC User Port to apple *
80 REM * Game controller socket *
90 REM *
100 REM * Entry point: &900 *
110 REM *
120 REM * Last Updated 2/7/84 *
130 REM *
140 REM *****
150 REM *
160 REM * VDU 15:REM Page mode off
170 REM * BASIC=&8E61:REM Clear screen
180 REM * Put Operating System Vectors i
nto variables
190 REM
200 REM * Input vectors: -----
210 REM
220 REM * RDCHV=&210:REM address of Read Ch
aracter Vector
230 REM * RDCHVL=?RDCHV:REM store low byte
240 REM * RDCHVH=?RDCHV:REM and high byte
s
250 REM * store address pointed to by Re
ad Character Vector:
260 REM * OSRDCH=?RDCHV+256*RDCHVH%
270 REM
280 REM * Output vectors: -----
290 REM
300 REM * WRCHV=&20E:REM Address of Write C
haracter Vector
310 REM * WRCHVL=?WRCHV:REM store low byte
320 REM * WRCHVH=?WRCHV:REM and high byte
330 REM * store address pointed to by WR
CHV:
340 REM * OSWRCH=?WRCHV+256*WRCHVH%
350 REM
360 REM * User port locations:
370 REM * PORT=&FE60
380 REM * DDR=&FE62:REM Data Direction Regi
ster
390 REM
400 REM * Zero page locations used by th
is routine:
410 REM * FLAG=&7A
420 REM * ACC=&7B
430 REM * WORD=&7C
440 REM * XREG=&7D
450 REM * WORDIN=&7E
460 REM * FUNC=&7F
470 REM
480 REM * Now start the assembly....
490 REM * liston=3:listoff=2
500 REM * list=listoff:REM change to listo
n for listing.
505 REM * IF list=listoff THEN CLS
510 REM * FOR I= 0 TO list STEP list%
520 REM * P=&900

530 [OPTI%
540 .K%
550 LDA #3 ;set up Data Direction Reg
560 STA DDR%
570 LDA #&FF; high bit set in FUNC den
otes we are sending
580 STA FUNC
590 LDA #OUTPUT% MOD 256
600 STA WRCHV%;change output vectors
610 LDA #OUTPUT% DIV 256 ;to point to s
tart address
620 STA WRCHV%+1; of this routine
630 LDA #2 ;initialize user port
640 STA PORT%
650 LDA #0
660 STA FLAG
670 STA ACC
680 STA WORD
690 LDX #1
700 JMP WRBIT
710 .L%
720 LDA #3
730 STA DDR%
740 LDA #NXTCHR MOD 256 ;change input
vectors
750 STA RDCHV%
760 LDA #NXTCHR DIV 256
770 STA RDCHV%+1
780 LDX #10 ;initialize for input
790 LDA #2
800 STA PORT%
810 LDA #0 ;zero stored in FUNC denote
s
820 STA FLAG;input
830 STA FUNC
840 JSR WRBIT
850 RTS
860 .OUTPUT%
870 STA ACC ;Save accumulator
880 STX XREG ;and X register
890 CMP #&7F ;DELETE Key?
900 BNE WRBYTE; No branch
910 LDA #8 ;turn delete into backspace
for the apple
920 WRBYTE
930 STA WORD
940 .NXTCHR LDX #8 ;8 Bits to read/wri
te
950 .WRBIT
960 ROL WORD
970 BCC SEND0
980 LDA #&C1;Mask with data bit on
990 BCS WRBIT1
1000 .SEND0 LDA #&C0; Mask for bits 6 a
nd 7
1010 .WRBIT1
1020 BIT PORT%
1030 BPL SET
1040 ORA #0
1050 STA PORT%
1060 BMI TEST

1070 .SET ORA #2
1080 STA PORT%
1090 .TEST LDA PORT%
1100 EOR FLAG
1110 BPL TEST
1120 LDA PORT%
1130 STA FLAG
1140 CLC
1150 BVC MAKEBIT
1160 SEC
1170 .MAKEBIT ROL WORDIN
1180 DEX
1190 BNE WRBIT
1200 LDA FUNC
1210 BEQ CHRIN
1220 LDA ACC
1230 LDX XREG
1240 CMP #&17 ;CTRL-W?
1250 BEQ exitoutput; Yes, terminate bee
to apple transmission
1260 JMP OSWRCH% ;No, output character
1270 CHRIN
1280 LDA WORDIN
1290 LDX XREG
1300 CMP #&17 ;CTRL-W?
1310 BEQ exitinput
1320 CLC ;Declare chr valid
1330 .EXIT RTS ;into the operating syst
em.
1340 .exitoutput
1350 LDA #WRCHV% ;restore vectors
1360 STA WRCHV% ;and exit via CLS
1370 LDA #WRCHV%
1380 STA WRCHV%+1
1390 LDA 0
1400 JMP BASIC%
1410 .exitinput
1420 LDA #RDCHV% ;restore vectors
1430 STA RDCHV% ;and exit via CLS
1440 LDA #RDCHV%
1450 STA RDCHV%+1
1460 LDA 0
1470 JMP BASIC%
1480 ]
1490 NEXT
1500 *KEYOCALL% M
1510 *KEYLCALL% M
1520 PRINT "BBC Micro to Apple transfer
program" ;"Type function key on BBC BBC
Micro" ;"before running apple interface p
rogram"
1530 PRINT "To send data type f0" ;"To re
ceive type f1"
1540 REM Data out line is PB0
1550 REM Clock out line is PB1
1560 REM Data in line is PB6 - directly
testable by the v bit.
1570 REM clock in line is PB7 - testabl
e with negative flag
>

```

Fig 3 BBC to Apple interface program

long to include here.) Fig 4 is an Applesoft Basic program which writes the BBC Micro's data to a text file.

Once you have an interface of sorts

```

]LOAD WRITER,D1
]LIST

5 REM BEEB 1.3.1 RENAMED BEEB.O
BJO
10 DS = CHR$(4)
13 IF PEEK(768) = 32 THEN 15
14 PRINT DS"BLOADBEEB.OBJ0"
15 PRINT DS"MONOI"
16 PRINT "CHANGE DISC IF NECESSA
RY..."; GET AS
17 PRINT
20 PRINT DS"OPEN BBC"
25 PRINT DS"DELETE BBC"
26 PRINT DS"OPEN BBC"
30 PRINT DS"WRITE BBC"
40 CALL 768
50 PRINT
60 PRINT DS"CLOSE"
70 PRINT DS"NOMONOI"

]

```

Fig 4 An Applesoft Basic program

up and working, you can easily add further features such as error checking. You could intercept the command line interpreter so that you could type \*APPLE on the BBC Micro and have Apple facilities at your disposal. Then you simply type \*BBC and continue processing.

This article features the BBC and Apple micros, but the idea could be used for any two machines not fitted with RS232 hardware.

CMOS 6502 and the manual are available from RCS Microsystems Ltd, 141 Uxbridge Rd, Hampton Hill, Middlesex Tel: (01) 979 2204. **END**



'I see you never having the faintest idea how to use your personal computer.'



# Spellbound

*Tom Vernon takes a break from recording TV and radio programmes to describe macro programming, the built-in ability to customise applications packages, using Spellbinder as an example.*

Buying a word processor is buying someone else's way of thinking. It is like choosing a companion. As a writer, I spend more hours with the authors of Spellbinder than with any human being. I know Bintz and Gee (the said authors) quite well by now. Bintz was a psychologist: Gee was lecturer at UCLA in Davis, California. They had a small scientific instrument company that used microprocessors, and needed an editor for the programming. Like the Apple empire, Spellbinder grew up in a garage — developed first as a ROM for the Z80 Exidy Sorcerer, and later for CP/M and MS-DOS.

I can cohabit with Bintz and Gee — at least in binary spirit — partly because they thought well in the first place, and partly because they sometimes let me hold the baby. Their program is itself partly programmable — the aspect which I will concentrate on in this article.

It makes sense to build flexibility into a package. Micro software writers rarely know the user, however well they understand the functions they are programming. Packages which are democratic in this way last better in a rapidly-changing marketplace. dBasell, for example, owes much — if not most — of its considerable success to its integral programming language.

But a professional-quality word processor needs a programmable element as much as any other database. Writing is the quirkiest, widest-ranging form of information: it is by humanity, for humanity — and only its simplest aspects are easy for machines. (The database to hold the elements of Shakespeare has yet to be created.)

## Flexibility

Spellbinder's flexibility comes from three sources, apart from its macros: modes, tables, and use of function keys. It has two modes of working, Edit

and Command, which treat text in different ways. Edit mode thinks in text units which may be either Word, Sentence, Paragraph or Character. (The Character unit allows you to underline or otherwise enhance spaces, which can be useful not only for printing, but also for drawing a band of reverse video to catch the eye in screen displays.) Command mode thinks in terms of screen lines, which are quick for deletion, movement by chunks, and for tucking text away in the temporary 'hold' buffer which is used for 'cut and paste' operations.

Until the latest version, users have not been able to work in screen lines while editing, which is irritating.

Spellbinder has always offered tables which allow the user to control printing extremely minutely (up to 1/960in on the Santec (Sanders) printer or a laser printer). The latest version, 5.30, has extended this principle to the point of embodying an extraordinary range of operating and configuring functions in decimal tables (relatively accessible, though not easy to figure out even with the help of *The Technical and Macro Manual* — a slim volume at a not-so-slim £50). The command PSn ('n' being from 1 to 14 and 128 to 137) displays the tables for alteration — at your peril — and PS puts them back. Use a copy of Spellbinder for experimenting.

Spellbinder's function keys are dynamic: that is, they change their function according to the type of operation in progress, in effect forming a command tree made out of a series of menus and sub-menus, with the changing key legends shown at the bottom of the screen. On the Sirius, seven function keys perform about 50 tasks relating to printing, disk access, formatting, searching, general editing, and global operations to deal with large files, which have to be progressively fed into

memory and out again as you work on them.

Although ideal for novices, however, function keys are rather slower than the single-letter commands available from the keyboard, particularly as these can be strung together as autocommands. E/U/T/F368, for example, will instantly take you to line 368 from anywhere in the text, having first dumped (Unheld) the contents of the hold buffer at the End. Top/Forward is the quick way of moving the cursor to where you want to go. Getting into the habit of using multiple commands lined by slashes can be a great timesaver, particularly for simple repetition ('25 s//HESELTINE /' will produce 25 repetitions of HESELTINE, for example, or '5 PA/FF/T' will Print All of a file five times from the Top with a Form Feed at the end of each one).

Soon, however, you will find that some commands tiresomely insist on your intervention. You cannot save time reading in one file after another from disk with a command like RO/Heselfil.Br/R/RD (Read Open/Filename/Read/Read Done), and nothing extra happens after a search command. The trick here is to type in the command at the end of whatever text you have in memory, put the cursor at the front and issue the commands AT (whereupon it will disappear) followed by A (to set it going).

Why not extend it? Add other lines, as in Fig 1. You have written your first macro.

## Macros

The Macro Programming Language (MPL) creates add-on programs that you can call up to work on the text in memory or on disk. Spellbinder is almost unique among word processors in providing them (although the Sirius Programmer's Toolkit contains PMATE, an editor entirely made up of much less friendly macros, and Word Perfect also has such a language).

Macros provide most of the features of Spellbinder which justify its claim to also be an 'office management system' — it must have been one of the earliest of all integrated packages! These features include: mailmerge; special

RO/Heselfil.Br/R/RD	; Read Open/Filename/Read/Read Done
sa/Heseltine/rhubarb/	; Search All (replacing Heseltine with rhubarb)
t/sa/missile/carrot/	; Top/Search All
t/pa/da	; Top/Print All/Delete All from memory

**Fig 1 How to write your first macro**





Illustration by Andrew Farley



printing functions such as two-column print, label and batch printing; standard form preparation and form filling; boiler-plate standard letters; calculation facilities which work from text or keyboard; sorting and keeping of lists as a simple database; column-moving; and entry of standard phrases at a single keystroke. Version 5.30 adds macros for footnoting and referencing, and tidying widows and orphans (stray lines of print isolated at the top or bottom of a page).

None of these macros, particularly the database, is going to break any records for speed, but they work. Many a small office or part-time business could probably run on them, keeping a few customer records, a semi-manual accounting system, and dealing more than adequately with its paperwork. Generally, however, the value of the macros is that they provide for an occasional need without the expense of buying new programs and — even more significant — the trouble of learning them.

Macros can be run from within Spellbinder at any time, providing there is space in the memory; they can be chained together; a menu of those available can be called up on a function key (which can also start them going again from the right point if they are interrupted); and Spellbinder begins and ends through macros, which gives you the chance of introducing sign-on and sign-off messages or facilities. I start with an automatic list of urgent things to do, for example (which I then ignore, of course).

Macros are fun to write. The language has its limitations — no PEEKing, rather limited maths, and it isn't practical to ask for continual screen rewriting (for example, showing the cursor moving one character at a time). But generally the language is easy and pleasant to use — and sometimes surprisingly powerful, since it calls upon most of the Spellbinder commands in addition to normal programming steps. It is easy to understand because processes going on in lines of text are concrete: the cursor moves comprehensibly around in a 26k block of text, altering it, searching it, shifting chunks of it, and formatting it.

Macros may be Heath Robinson programming — that is part of their charm — but they also have the advantage of being outstandingly portable. They are created as ASCII text files and stay that way, so they are easily transferred and run on any machine with Spellbinder. You can even write macros on another word processor: I regularly create them on Microwriter, for example.

Fig 2 is the macro I constantly use. It provides hold, movement and deletion facilities on the basis of cursor position, which is registered at the first press of

the macro key that immediately dumps you back into edit. At the second press of the key, the macro registers the new cursor position and gives you the choice of deleting or holding everything between old cursor and new cursor, or of returning to the original place. Deleting backwards is not otherwise possible in Spellbinder, and you normally have to decide the end of your hold or deletion in advance. The macro also bypasses the safety procedures

which ask you to confirm that loss of too much text is OK.

The macro starts by assigning a string variable used for later comparison. MPL has only 10 integer and seven fixed-point variables (%1 to %0 and %a to %g) but up to 26 13-character string variables, so it is often economical to use string variables as flags. (Maximum string size is set with an instruction like :SS 13 159 13, although it may be temporarily fixed with :SF and padded

```

;
; CURSOR.M1.WPM
; String variable B = 'Hold'
:in %1 / RETURN CURSOR AND INTER-CURSORS HOLD, DELETE - WARN AT ? LINES (No./Ret) " %1
:on %1 / / +1
;%1 = 5
;%A = %1
:se %A
:cp
:ee 10
:pr %13/ CURSOR NOTED " ; NOTE FIRST CURSOR POSITION
;%2 = $2 ; column number
;%3 = $3 ; row number
:cp
:ee 16 ; Exit to Edit Mode, with restart at line 16
;
;%C = " " ; CHOOSE FUNCTION
:pr %13/ RETURN, DEL CHAR (kills lines, warns at %A), H (replaces hold) "
:rk %0
:on %0-17 / / +12 / ; ASCII 17 is my Delete Character key
:on %0-42 / +4 / +2 /
:on %0-72 / +3 / +1 /
:on %0-104 / +2 / / +2
;%C = "Hold"
:on -1 / +7
;%0 = 0
t/f%3-1 ; RETURN CURSOR TO ORIGINAL PLACE
:mc %2
:cp
:ee 10
;
;
:on %3-$3 / +9 / / +2 ; IS NEW PLACE FORWARD OR BACKWARD?
:on %2-$2 / +8 / +31 /
;
;%8 = %2 ; ADJUST FOR BACKWARD
;%9 = %3
;%2 = $2
;%3 = $3
t/f%9-1
:mc %8
;
;%7 = 0 ; PREPARE FOR ACTION
:on ?-13 / +2 / / +2
;%7 = 1
:on -1 / +1
s//</
;%6 = $3-1
;%5 = %6-%3+%7
:on %1-%5 / / +5 / +5
:pr %13/ * OVER LIMIT OF %A LINES - BUT YOU CAN Esc IF YOU'RE QUICK * "
;%0 = %0 ; delay
;%0 = %0+1
:on %0-300 / -2 / /
;
;%7 = 0 ; DELETION
:on %B%C / / +7 /
t/f%3-1
:mc %2
d%5+1
:cp
:ee 10
;
;
;%5 = %5+1 ; HOLD
h0
t/f%3-1
:mc %2
h%5/e/s//</
u/e/b1/s//</
b%5/h0/h1000
t/f%3-1
:mc %2
:cp
:ee 10

```

Fig 2 This macro provides hold, movement and deletion facilities



or truncated accordingly.)

Line numbers are implicit: MPL lines begin with a colon whereas word processor command lines have none. MPL treats everything after a semicolon as a comment: in pre-version 5.30, it requires ingenuity to use a plain semicolon in a macro. You can move the cursor along until the ASCII value underneath it is returned as 59 (Fig 3).

Another way is to search for a semicolon using 's/\*;', which has an enhanced semicolon that the macro will not object to, and an asterisk for non-specific search so that it is likely to end up at an unenhanced semicolon instead.

The branch routines work by testing a value against 0. If it evaluates as less than 0, the macro jumps to the line number next to the left-hand slash; if 0, the middle line number; if greater than 0, the right-hand one. String comparisons are evaluated by ASCII code in the same way, although the syntax uses no operator but simply puts them together (for example, :on %A%B//). Strings are combined with the form :%C = %D%A%B.

Maths is limited to plus and minus and what you can do with them, although the calculator macro supplied with Spellbinder does quite well.

That is most of what is needed for a first understanding of the language, although there are also String Enhance and Read Key (for ASCII number) macro instructions, interrogators for String Length, and read or write file (\$0 or \$1) open or closed. INput and PRint work in much the same way as their Basic equivalents.

MPL is properly covered in the *Macro and Technical Manual*, which is well-written but expensive.

Since this macro in effect institutes a command branch at the second press of the CONTINUE key, there is no reason why other keys should not be used to perform other simple operations. But bear in mind, however, that the whole point of a macro addition like this is simplicity and efficiency. Beware of re-inventing an asymmetrical wheel. I was halfway through a macro for film budgets when I suddenly realised that I was writing a spreadsheet, and that I would be better off using Multiplan.

There are limitations to macros. Spellbinder is no better than most other micro word processors in being able to address only 28k of text in memory, including the macro. Larger files have to be manipulated on and off disk, as do files to be used by other programs.

There are two types of speed in computing — the instant answer, and the process that happens automatically while you are making a cup of coffee. Complicated macros, like my punctuation checker, TV script formatter, word counter, filer for random thoughts, and comparer of similar files, definitely come into the second category. I also have a simple dot-graphics program for a daisywheel printer.

```
:mc $2+1
:on $2-79 /+//      ; when at end of 80-column line
f1                  ; move down one row
:on ?-59 /-4// -4    ; loops back four lines unless ASCII under
                      ; cursor is 59
:%A = !              ; %A = the string under cursor
```

Fig 3 It requires ingenuity to use a plain semicolon in a macro

### Programming wrinkles

You have to avoid commands which stop and ask for user intervention. Getting a directory, deleting a file, holding or deleting without specifying how many lines, and holding to a buffer that has something already in it will all stop you in your tracks. There are positional points to watch, such as allowing for the fact that variables start at 0 while line numbers start at 1, or that

*'... a professional-quality word processor needs a programmable element as much as any other database. Writing is the quirkiest, widest-ranging form of information... only its simplest aspects are easy for machines.'*

when a string is read from text with ! the cursor ends up after it, or after the delimiter if one is specified !..

It is much easier to see a cursor moving around in a chunk of text than to cope with the abstractions of normal programming, and the current state of play can be shown onscreen by using the Cursor Print instruction. Looking at what is happening is a main diagnostic tool, along with the AI command (which executes the macro step by step) and the :in instruction to stop the macro at that point. However, 'in' does not evaluate variables, so to show their current state on the message line with the cursor in text below, you need:

```
:pr "#1/ Variables are %1 %2 %A %a"
:cp
:in
```

```
:in "HOW MANY LINES?          ENTER NUMBER cr " %2
:in "NOW TYPE A SEMICOLON or  " %A
;
:%3 = %3+1
:%1 = %1+1
s//%A -                      %A %1</
:%1 = %1+1
:on %3-10 /+3//
:%3 = 0
s//%A x                      %A %1</
:on -1 /+1
s//%A                        %A %1</
:on %2-%1 ///-10
:ec
```

Fig 4 A macro written in a numbered format

Whether or not you use relative line numbers in branching (/+5 or /22) there is a good deal of line-counting writing macros, particularly when making alterations within nested loops. A macro to renumber line numbers in macros is useful, or you can write your macro in a numbered format. This is easily created, in spite of the semicolon problem, with extra indication of odd lines and tenth lines (Fig 4).

Other useful tools are macros to print ASCII values of the keys on the keyboard, to test printwheels, to make multiple searches for combinations of words occurring within a certain distance of each other, and to convert text to other formats, such as a database. Spellbinder creates either sequential or system files, but random access files need to be filtered through Basic.

Another limitation is the presence of the soft carriage return character ASCII 14 at the end of every screen line except those terminated by a carriage return. In practice, therefore, data must be in segments with not more than 158 characters between carriage returns (159 characters is the maximum Spellbinder screen line). This could be a limitation on some dBase III fields, for example, but not on dBase IV, which only allows half that length anyway.

Spellbinder is a very safe program, but people make mistakes. I find that a desirable addition to Spellbinder is a short Basic program (Fig 5) that PEEKs the memory and writes to disk anything there which you want to keep; then you never lose anything, unless you have to re-boot. With MS-DOS 1.25 on my system, this only happens if you try to print a dead printer, although you can also be dumped in the operating system if you give the wrong answer to the MS-DOS error message 'Abort, Retry or Ignore', which occurs if you access an empty driver. I have also known much-repeated use of the AT command to cause problems. With



# لتزويد منازلكم بوسائل حديثة للمعرفة

٩٩٥ ريالاً  
كمبيوتر  
عرب ورام



أدخل وعالمك عالم الوسائل التعليمية ولترفيهية الحديثة..

باللغتين العربية والانجليزية.. باقتناء الأجهزة الكمبيوتر سنكليس عرب ورام الملونة الرائعة..  
كمبيوتر سنكليس جهاز مدمج ومحكم الصنع.. يمكن لأي شخص استخدامه  
في المجالات التعليمية - العملية - الترفيهية..

**لغة كمبيوتر خاصة سعودية** يمكن توصيله بأي جهاز تليفزيون أو تسجيل  
ذاكرة سعة ٤٨ كى - مع كمية من عناصر البرمجة التشغيلية، الكتب،  
معدات إضافية لاستعمالات عديدة.

**سنكليس**

أكثر أجهزة الكمبيوتر شعبية في العالم العربي

بكويت : ٤١٤٤٠٤  
بيروت : ٣١٣٩٥١  
قطر : ٤٢٨٥٥٥  
البحرين : ٥٥٣٤١٦  
رأس : ٢٣١٥٨١  
عمان : ٧٠٣٧٧٧  
طرابلس : ٦٢١٢٢١  
لندن : ٨٠٢١٢٣٨

الرياض : ٤٠٥٤٩٨٥  
مكة المكرمة : ٥٤٤٥٦٢٣  
جدة : ٨٦٤٦٧٨٧  
البحر : ٨٩٥٢٩٩٨  
بغداد : ٨٤٢٠٤١٥  
النجف : ٥٤٤٢٦٦٦  
تليفون خاص لاستفسار بيلت فقط مكة المكرمة : ٥٤٥٢٥٩٢



جهاز الكمبيوتر الوحيد عرب ورام الذي يباع ويصان في المملكة العربية السعودية والشرق الأوسط بواسطة  
صوب : ١٤٧ جدة (٢١٤١١) المملكة العربية السعودية  
تليفون : ٢٦٥٣٧١٥ (٠٢) تليكس : ٤٠٢٢٧٦

## HISOFT High Quality Microcomputer Software

**FONT 464** is an easy-to-use program enabling you to design, edit, and save your own characters and graphics for simple use in BASIC programs. There are 6 pre-designed fonts and sophisticated printer-driving software which allows high-resolution screen dumps and letter writing on Epson compatibles or the DMP1.

**DEVPAK** is a complete machine code development package. It is the second one that many people buy, because after the first one they know what to look for! The 'front panel' debugger is the only way to really see programs in action, and assembly from multiple source files is fast enough to satisfy its most demanding users - ourselves.

**Pascal** is a valuable educational and development tool as well as running typically 40 times faster than a BASIC equivalent. Our compiler is an almost full implementation which compiles direct to machine code (no slow P-codes). Multiple file inclusion allows very large programs to be compiled.

**MON QL** is our latest product and our first on the QL; it was written by Andy Pennell, who has a great deal of experience on the QL. It is similar in style to the well-known MON 'front panel' in DEVPAK and includes additions like job control and multi-tasking support. It also catches system exceptions and includes fixes for QDOS.

Product Price Table

	Pascal £	DEVPAK £	C £	ULTRAKIT £	FONT 464 £
ZX Spectrum	25-00	14-00	25-00	9-45	
Amstrad CPC464	29-95	21-95			7-95
MSX	29-95	19-95			
CP/M-80	39-95	39-95			
Sharp	39-95	25-00			
Sinclair QL		19-95 (MON QL)			

All prices are for cassette versions (except CP/M and QL) and include VAT and p&p in the UK. Please contact us for export orders, disc formats or detailed technical information packs. All products are available by mail order: please send a cheque or Postal Order. Sorry, we do not accept credit cards.

## HISOFT

180 High Street North,  
Dunstable, Beds. LU6 1AT  
Telephone (0582) 696421



other operating systems, Spellbinder can provide extra facilities such as text recovery and the ability to run other programs from within itself (apart from its own macros).

## New versions

Version 5.30 of Spellbinder is a partial rewrite to make the program easier to adapt to new machines. It has a bundled spelling and grammar checker — Electric Webster — far below the standard of Spellbinder itself; and is the basis of the new Scientific Spellbinder, which contains a full set of Greek letters and scientific symbols among up to 224 different characters.

You can issue command mode commands from Edit, view disk directories selectively, and have two read files open at once. There are new macro instructions, but the greatest change is in adaptability.

Previous versions kept a proportional spacing table in quite accessible decimal/ASCII format. 5.30 has a major part of the configuration as tables which are capable of being manipulated by people who have some knowledge, but who have not yet graduated to machine code. You can redefine the way the function keys work, and the way the printer prints, the screen behaves or the keyboard works. You can have a second

character set replacing the enhanced set, or control screen colour on an IBM PC.

This process is in a different league from macro-writing. The inexperienced user would be wiser to get a dealer to configure a package for special facilities like French accents, and so on. (Up to 16 extra characters are readily available, with their enhanced versions.) Sierra Systems of Epsom (which supplied my (early) copy of 5.30) throw in extra characters with the package, and will configure others cheaply.

There are several desirable macro features not listed in my older manual, but most of which seem to work with version 5.20 at least. An On Error instruction (:oe 1) brings you back to a specified line; and String Get (:sg %A %61) extracts the first character in a string and converts it to an ASCII value. There is a useful tracer in \$4, which returns the current macro line number +2, and you can read indent values with the \$5 function but change them only in 5.30 with the Set Indent instruction.

String Put (the opposite of String Get) solves the problem of the semicolon, being a means of converting an ASCII value into the character it represents. It leaves Spellbinder macros with few limitations as an easy (if leisurely) means of text-handling, notably: the fact that you cannot save a disk directory as a text file and use macros for disk housekeeping; and the size of the text buffer (a 64k text version has been seen, but not sold).

My current macro is one to create dot-graphics on a daisywheel printer. It is a ridiculous task to give to a word processor — every time I draw a cow it looks like a dachshund — but I am far from convinced that even here macros have met their match.

*Thanks to Geoff Wilkinson of Sierra Systems, 6 The Greenway, Epsom, Surrey KT18 7HZ, tel: (03727) 22890, for supplying an early copy of Spellbinder 5.30 and the Technical and Macro Manual.*

*A Spellbinder Users' Group exists which will enable users to pool their knowledge and experience, and to seek help and advice from other users, especially on advanced applications and macro programming. It will be a non-profit, self-help group but will be supported by the UK distributors, who have promised technical advice and assistance with publicity.*

*Interested readers should contact Dermot Quirke at PO Box 14, Newark, Notts NG24 4TP, or phone (0636) 77313 between 10am and 10pm for details.*

*Tom Vernon is a journalist and broadcaster, and is best known for his radio and TV travelogues.*

**END**

```

10 REM          SALVAGE.BAS TRIES TO SALVAGE TEXT FROM SPELLBINDER CRASHES
20 REM          SPELLBINDER TEXT MEMORY 5136-33462 APPROX IN SIRIUS
30 REM
40 PRINT CHR$(27);"E";
50 PRINT: PRINT: PRINT "SALVAGE PROGRAM": PRINT: PRINT
60 PRINT "TO USE THIS PROGRAM, READ MEMORY FIRST TO CHOOSE WHERE TO START"
70 PRINT "AND WHERE TO STOP SAVING TEXT."
80 PRINT "THE FIRST POINT AT WHICH A KEY IS PRESSED DURING THE READ WILL"
90 PRINT "BE THE START: THE SECOND PRESS OF A KEY WILL CHOOSE THE END.": PRINT
100 PRINT "1. Read memory, and choose starting and stopping points.": PRINT
110 PRINT "2. Save chosen part of memory to disk.": PRINT
120 PRINT: PRINT "          CHOOSE 1 or 2": PRINT
130 G$=INKEY$: IF LEN(G$)=0 THEN 130
140 IF ASC(G$) <49 OR ASC(G$)>50 THEN 120
150 IF ASC(G$)=49 THEN 170 ELSE 390
170 PRINT: PRINT "          WHAT STARTING ADDRESS?": PRINT
175 PRINT: INPUT "          (For Spellbinder text - 5136 upwards) ",C
180 PRINT
190 PRINT "          WHAT ADDRESS TO END?"
195 INPUT "          (For Spellbinder text - below 33250 - enter RETURN )",D
196 IF D=0 THEN D=33250!
198 PRINT CHR$(27);"E": PRINT: PRINT "          ** STARTING AT ";C;":
ENDING AT ";D;": ***"
199 PRINT: PRINT "          ** PRESS A KEY FOR PRECISE START; AND AGAIN FOR END
***": PRINT
200 FOR A = C+1 TO D
210 B=PEEK(A)
220 IF B=3 THEN 230 ELSE 240
230 PRINT: PRINT "          ** POSSIBLE END OF A SPELLBINDER FILE HERE! ***":
PRINT
240 IF B=13 THEN PRINT
250 IF B=14 THEN PRINT CHR$(32);
260 IF B<32 OR B>126 THEN 280
270 PRINT CHR$(B);
280 H$=INKEY$: IF LEN(H$)=0 THEN 330
290 IF I$ = "SET" THEN 360 ELSE 300
300 I$ = "SET"
310 C = A-124
315 PRINT: PRINT
320 A = A-160
330 IF A = C THEN 340 ELSE 350
340 PRINT: PRINT: PRINT "          ** STARTING ADDRESS SET HERE: AT ";C; " ***":
PRINT
350 NEXT A
360 PRINT: PRINT: PRINT: PRINT "          ** START-STOP ADDRESSES ARE ";C;":
TO ";A;": ***"
380 GOTO 50
390 PRINT CHR$(27);"E": PRINT: PRINT "          ** START ADDRESS: ";C; " STOP
ADDRESS: ";A: PRINT: PRINT
400 PRINT: PRINT: PRINT: INPUT "          FILENAME FOR SAVED TEXT ";
FILES$
402 IF LEN(FILES$) = 0 THEN 400
405 PRINT: PRINT
410 OPEN "O",#1,FILES$
420 FOR F = C TO A
430 B = PEEK(F)
440 PRINT#1,CHR$(B);
450 IF B=3 THEN 480
460 IF B=13 THEN PRINT
465 IF B=14 THEN PRINT CHR$(32);
470 IF B<32 OR B>126 THEN 490
480 PRINT CHR$(B);
490 NEXT F
500 CLOSE #1
510 PRINT: PRINT: PRINT FILES$; " IS NOW ON DISC": PRINT
520 END

```

**Fig 5 Basic program to PEEK memory and save contents to disk**



# Return to sender

*A mystique prevails over the exact workings of an electronic mailbox. Peter Vekinis presents his own mail database program which thoroughly illustrates the procedures involved.*

The proliferation of personal computers in homes and offices over the last few years is the direct consequence of the never-ending search for increased productivity and improved communication by people around the world.

Although many facilities exist today that help the user type a letter, calculate a cheque or obtain a list of groceries, few possibilities exist to enhance communications needs. Mail has been the basic means of communication of millions for more than a century. The tie-in of mail and the personal computer would seem a natural evolution, but alas that is not the case.

Electronic mail companies do exist today; their service is a highly needed one and, in most cases, efficient. However, for most users electronic mail is so nothing that resembles a mailbox. User A sends a letter to user B who, upon looking at his 'electronic' mailbox, reads the contents of the letter. Users do not know what actually takes place and how the letter goes from one place to another in the mailbox. All they have to do is dial a number, connect the personal computer to a remote computer system and send the letter after signing on. It seems that some kind of mystique prevails over the operation.

The program in Fig 3 illustrates in a pedagogical way how an electronic mail program works. Although the program is mainly intended for illustrative purposes it can be used for on-site mail, and is designed in a way that permits easy expansion.

## In use

Type the program into an appropriate computer (an IBM PC is ideal). When the program starts it asks for the date, and a menu appears from which the user is asked to select a function. The menu accepts various entries, each corresponding to a unique action as shown in Fig 1. Since this is the first time the

program is run, press the '5' key, followed by the Enter (RETURN) key. This takes you to the system set-up code which will set up the required files used by the program.

Enter the password 'peter' as in Fig 3, or the password you have chosen, and the program will ask you for the number of sectors which indicates the maximum number of lines (each up to 80 characters long) the mail database can contain at any time. Type 100 and press RETURN. Then type in the name that you would like to call the mail database, and the system file will be initialised as shown by an appropriate message on the screen.

### Operation Menu

- 1 = Send Message
- 2 = Get Message
- 3 = List Users
- 4 = Exit
- 5 = System Setup
- 6 = Display Data Base

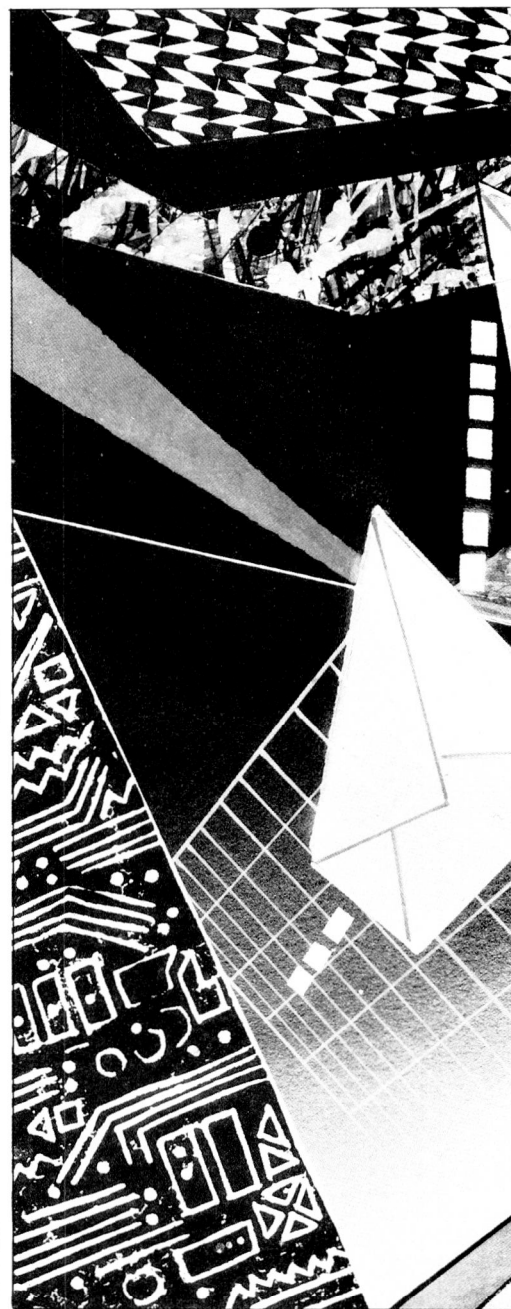
Enter Action?

Fig 1 The operation menu

The program will then initialise the actual mail data file in a specific way called the 'sector availability sequence' (SAS), as well as keeping you informed of the sector being initialised.

The user list or directory is set up next, which requires you to enter the mail system users' names. You can enter a name up to 30 characters long, although only the first four are significant. When the names are entered, enter the name 'END' which signifies the end of the user list; a maximum of 20 names may be entered. The program has now finished the initialisation of the required files and you are taken back to the main menu.

To send a message, press the '1' key followed by RETURN and the program

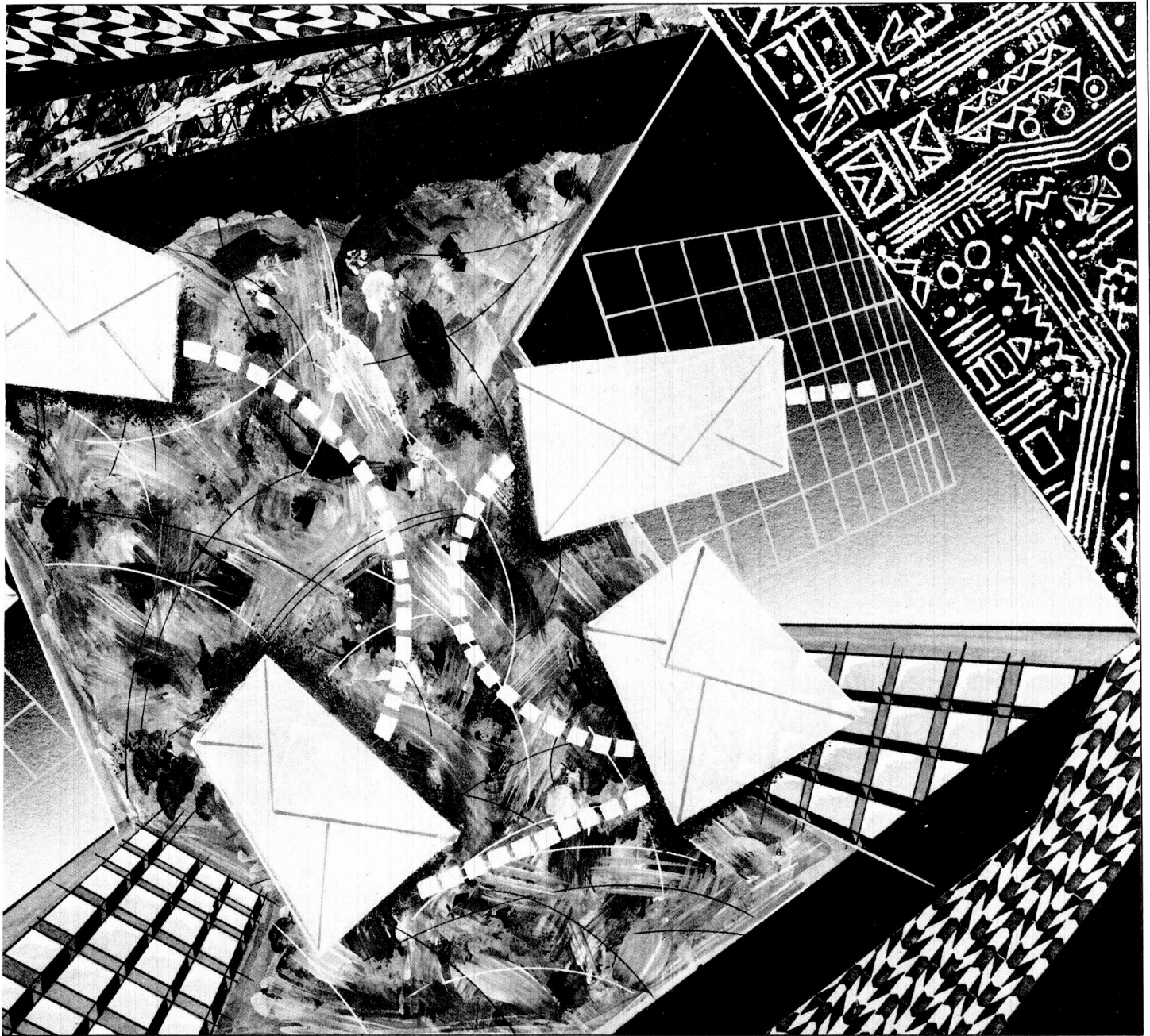


will ask you for the name of the message which may have up to 30 characters of text. The screen will be cleared and the program will wait for your message entry. The message is normally composed of lines which are terminated by the RETURN key, as on a typewriter. When the message is finished, the sequence "[@@@]" must be typed, which tells the program that the message entry is finished.

The user name must then be entered, which is a name that corresponds to one of the names entered in the user directory. At this point the program will return to the main menu and wait for another command.

To see the message on the user list, press the '3' key followed by RETURN and the user list will be shown. You will notice that the 'Cnt=' field of the line displaying the user's name selected shows the number '1', which means that one message is actually tagged to that user. Also, the 'Total cnt=' entry also has '1' as this is the first message.





#### System file 'SYSTEM.SYS'

Database name	Date created	Date last used	First free sector number	Last free sector number	Sectors used	Total sectors
(8 bytes)	(8 bytes)	(8 bytes)	(3 bytes)	(3 bytes)	(6 bytes)	(4 bytes)

#### User directory entry 'USER LIST'

User name	Date created	Count of current messages	Count of total messages	First sector pointer	Last sector pointer	Usage flag
(30 bytes)	(8 bytes)	(3 bytes)	(5 bytes)	(3 bytes)	(3 bytes)	(2 bytes)

#### Mail database 'MAIL.DAT' typical sector (record)

Previous sector pointer	Message name	Text data — line	Actual record pointer	Next sector pointer
(3 bytes)	(30 bytes)	(80 bytes)	(3 bytes)	(3 bytes)

Fig 2 The SYSTEMS.SYS, USERLIST and MAIL.DAT files



# COMMUNICATIONS

To read the message, press '2' after returning to the main menu: this takes you to the program part that reads messages for each user. Assuming that you are the target user, enter the username used as the target name in the send operation, and the system will try to find the message. If you have entered the correct name, the system will ask you whether you want the message printed on a printer, at which point reply 'n' followed by RETURN. The last line on the screen (that is, the 25th line) will show the message name, while the message will be shown on screen. If the message exceeds 18 lines, the RETURN key must be pressed to continue the display. When the process is finished, the system will ask you whether you would like to accept the message or not. If you enter 'Y' the system will update the files, so for all practical purposes the message has been deleted (in reality it has not, as will be shown). Subsequent display of the user list will have a zero in the current count field although the total count field will contain a '1'.

If you enter anything but 'Y', the program returns to the main menu and

```

20 REM *****
30 REM # IBM PC Electronic mail executive
40 REM #
50 REM # Copyright Peter P. Vekinis 1984
60 REM #
70 REM #
80 REM # Micro Business Products
90 REM # 43 ave. De l'Observatoire
100 REM # 1180 Brussels, Belgium
110 REM # Tel : 02/ 375 3709
120 REM #
130 REM *****
140 REM *****
150 REM The following opens the three files
160 GOSUB 2400
170 CLS
180 LOCATE 10,20
190 PRINT " IBM PC Electronic mail Package"
200 DA2$=DATE$:LOCATE 14,30:PRINT DA2$ "get the date and show it
210 LOCATE 25,70:PRINT TIME$
220 GOSUB 2380
230 CLS
240 GET #1,1 "get the system file from the disk
250 LOCATE 10,30 "show the startup menu
260 IF #1=0,1
270 PRINT " Operation Menu"
280 LOCATE 13,25
290 PRINT "1 = Send Message"
300 LOCATE 14,25
310 PRINT "2 = Get Message"
320 LOCATE 15,25
330 PRINT "3 = List Users"
340 LOCATE 16,25
350 PRINT "4 = System Setup"
360 LOCATE 17,25:PRINT "5 = Exit"
370 LOCATE 25,70:PRINT TIME$
380 LOCATE 22,25:INPUT "Enter Action";A
390 IF A < 1 OR A > 5 GOTO 410,950,1520,1670,1530
400 IF A < 1 OR A/4 THEN 230 "highlight mode and
410 REM the send message code function
420 CLS
430 IK=1
440 CN3=CVI(PERCENT$)
450 IF CN3=(CVI(TOTSEC$)) THEN CLS:LOCATE 15,30:PRINT "Data Base Full":GOSUB 2380
:GOTO 230
460 LOCATE 10,10
470 INPUT "Enter message name please";FNAM$
480 FREX=CVI(FRESTR$)
490 GET #3,FREST
500 GET #3,FREST
510 CLS:LOCATE 25,1:PRINT "Enter the text with CR at each
:line end. Enter [000] t
:o end"
520 LINE INPUT TEX$
530 LET FNAMES=FNAM$
540 FREX=CVI(RECNO$)
550 IF TEX$="[000]" THEN 640
560 GET #3,FREST
570 LET FNAMES=FNAM$
580 CN3=CN3+1

```

**Fig 3 Program which illustrates how an electronic mail program works**

### System file

Name	Date created	Date last used	First free sector	Last free sector	Sectors used	Total sectors
Mailbase	7/9	7/9	10	11	9	11

User name	Date created	Current MSG count	Total MSG count	First sector pointer	Last sector pointer	Flag
Peter		1	1	1	5	0

User name	Date created	Current MSG count	Total MSG count	First sector pointer	Last sector pointer	Flag
John		1	1	6	9	0



Message																																
Text																																
0	1	2	1	2	3	2	3	4	3	4	5	4	5	0	0	6	7	6	7	8	7	8	9	8	9	0	0	10	11	10	11	0

Previous  
record  
Record  
number  
Next  
record

**Fig 4 The mail database with two users**



```

90 IF CN3=(CVI(TOTCNT3)) THEN CLS:LOCATE 15,20:PRINT "Data Base Full - Force se-
ore":GOSUB 2380:GOTO 640
600 LSET TEXT$=TEXT$ "the data base.
610 PUT#3,FREST "store the text and read

620 FREST=CVI(NEXTP4) "the next free sector
630 GOTO 520 "which is pointed to by
640 CLS "a field in the current
650 HHJ$=MKI$(FREST) "record and loop.
660 LSET FREST$=NEXTP$ "use the next pointer as the new first
670 GET #3,CVI(HHJ$) "available sector while ensure that
680 LSET NEXTP$=MKI$(0) "the next sector field of the current
690 LSET DATEL$=DA2$ "sector is set to zero. Update the date
700 PUT #3,CVI(HHJ$) "and store the data.
710 LOCATE 15,30
720 INPUT "Send to ?":USE$ "ask for the user name and look for
730 RE=1 "it in the user list.
740 GET #2,RE
750 IF LEFT$(USE$,4)=LEFT$(USER$,4) THEN 780 "if the first 4 letters match
760 IF EOF(2) THEN 1550 "then continue else show message

770 RE=RE+1:GOTO 740
780 TUN1=CVI(POIN$) "if the user already has a message
790 IF POINTC>0 THEN GET#3,CVI(POINTC):LSET NEXTP$=MKI$(TEMP):PUT #3,CVI(POINTC)
810 LSET POINTC$=HHJ$
820 CN=CVI(TOTCNT$)
830 CN=CN+1
840 LSET TOTCNT$=MKI$(CN)
850 CN1=CVI(CNT$)
860 CN1=CN1+1
870 LSET CNT$=MKI$(CN1) "also update the counter of messages
880 PUT #2,RE "for the user and store it in the
890 REM "directory entry.
900 LSET PERCENT$=MKI$(CN3)
910 PUT #1,1
920 GOTO 230
930 REM
940 REM The following code performs the get message function.
950 GET #1,1
960 CLS
970 LOCATE 10,10
980 CN4=CVI(PERCENT$)
990 INPUT "Enter user name please":USE$ "Get the number of sectors used
1000 CLS:RE=1 "and the user name
1010 GET #2,RE
1020 IF LEFT$(USE$,4)=LEFT$(USER$,4) THEN 1050 "If the first 4 letters match
1030 IF EOF(2) THEN 1580 "then continue, else show error

1040 RE=RE+1:GOTO 1010
1050 PO=CVI(POIN$):IF PO=0 THEN CLS:LOCATE 15,30:PRINT "No messages":GOSUB 2380:G
GOTO 230
1060 GET #3,PO "get the sector pointed to by
1070 PO2=PO "the user directory entry and
1080 CLS "ask the user whether printed
1090 LIN=3 "output is needed for lprint.
1100 CLS:LOCATE 15,20:INPUT "Use the printer ?(Y
VC=1 ELSE VC=0 "or N)":ADR$:CLS:IF ADR$="Y" THEN
1110 GET #3,PO "Get the first sector and
1120 LOCATE 25,10:PRINT "Message name = ";PNAME$ "show the message name on screen

1130 IF EOF(3) THEN LOCATE 15,30:PRINT "no more - end of disk":GOSUB 2380:GOTO 23
0
1140 NEXT CVI(NEXTP$) "end the next sector by fol-
1150 IF VC=1 THEN LPRINT TEXT$ "lowing the list pointers until
1160 LOCATE LIN,1:LPRINT TEXT$ "it is zero which means the en

```

When the program is used to initialise the database and the user is asked to enter the number of sectors required for

Name	Date created	Date last used	First free sector	Last free sector	Sectors used	Total sectors
Mailbase	1990	1990	10	5	4	11

User name	Date created	Current MSG count	Total MSG count	First sector pointer	Last sector pointer	Flag
Peter		0	1	0	0	FF

User name	Date created	Current MSG count	Total MSG count	First sector pointer	Last sector pointer	Flag
John				6	9	0

[illegible]

Previous  
record  
Record  
number  
Next  
record

JUNE 1985 PCW 185



## COMMUNICATIONS

storage of messages, it creates what I call the 'sector availability sequence' (SAS) which is a way of tying sectors together so that they point to each other. The MAIL.DAT part of Fig 2 shows what a sector looks like as used for message storage. The first three bytes contain a pointer that points to the previous sector number if any or zero, if this is the first sector of the SAS or of a message.

The next 30 bytes are used to store the name of the message. Following that is the actual text, one line at a time. This is followed by a three-byte field containing the number of the actual sector, and another three-byte field that contains the next sector number if any or zero, if this is the last sector of the SAS or the last sector of the message.

Upon initialisation the pointers are sequential, starting from 1 up to the number specified. As no sectors are used (that is, no messages sent), the first free sector pointer of file SYSTEM.SYS as shown at the top of Fig 2 contains 1, while the last free sector field contains 100, this being the last

```

1170 CN4=CN4-1                                     'of the message.
1180 IF NEX=0 THEN PRINT:PRINT:PRINT"-----"
1190 PO=CVI(NEXTP$)                                'If the message is more than
1200 LIN=LIN+1                                       'input to continue. When the
1210 IF LIN=18 THEN PRINT:PRINT:PRINT:INPUT"Continue ?";CN4=CLS:LIN=3:GOTO 1110 'message is finished, ask to

1220 GOTO 1110                                       '18 lines, then wait for key
1230 PRINT:PRINT:PRINT                             'input to continue. When the
1240 INPUT"Accept the message (Y or N)";YE$       'message is finished, ask to
1250 IF YE$<>"Y" THEN CLS:LOCATE 15,25:PRINT"Message retained":GOSUB 2380:GOTO 2
30
1260 GET#2,RE                                       'accept it or not. If yes, then
1270 LSET POINS=MKI$(0)                            'update the user directory
1280 LSET POINTE$=MKI$(0)                         'pointers to zero and decrease
1290 CN3=CVI(CNT$)                                  'the current message counter.
1300 CN3=CN3-1
1310 LSET CNT$=MKI$(CN3)
1320 PUT #2,RE
1330 FR=CVI(FREND$)                                'Update the sector pointers so
1340 LSET FREND$=MKI$(PO)                          'that the sectors freed end up
1350 GET #3,FR                                       'pointers to zero and decrease
1360 LSET NEXF$=MKI$(PO2)                          'at the end of the availability
1370 FJ$=RECNO$                                     'list.
1380 PUT#3,FR
1390 GET #3,PO
1400 LSET NEXF$=MKI$(0)                            'Zero the last sector's next
1410 PUT#3,PO                                       'sector pointer and update
1420 GET #3,PO2                                     'the sector counters of the
1430 LSET PREV$=PJ$                                'system file as well as the
1440 PUT#3,PO2                                     'number of the first
1450 GET #3,CVI(FRESTR$)                          'sector available as pointed
1460 LSET PREV$=MKI$(0)                            'to by the system file.
1470 PUT#3,CVI(FRESTR$)
1480 LSET PERCENT$=MKI$(CN4)
1490 PUT#1,1
1500 CLS:LOCATE 15,30:PRINT"All Done":GOSUB 2380..
1510 GOTO 230
1520 GOTO 1610
1530 CLS:CLOSE
1540 END
1550 IF RE>20 THEN LOCATE 15,30:PRINT"No such user":GOSUB 2380:GOTO 710
1560 IF RE<20 THEN GOTO 640                        'If the user name is not there, show
1570 IF USE$="END" THEN 230 ELSE LOCATE 15,30:PRINT"No such user name":GOSUB 238
0:GOTO 710                                         'show error message
1580 IF RE>20 THEN LOCATE 15,30:PRINT"No such user":GOSUB 2380:GOTO 230
1590 IF RE<20 THEN GOTO 1040
1600 LOCATE 15,30:PRINT"No such user name : End of file":GOSUB 2380:GOTO 230
1610 K=1
1620 CLS:LOCATE 2,30:PRINT"User Directory"
1630 GET#2,RE
1640 IF FL$="FF" THEN PRINT:PRINT:INPUT"OK ?";A$:GOTO 230 'Show the user directory, as long as the
1650 PRINT"User name ";USER$; "Cnt=";CVI(CNT$); "Total cnt=";CVI(TOTCNT$) 'password is not FF
1660 K=K+1:GOTO 1630
1670 CLS
1680 LOCATE 15,30                                  'Come here to setup the system which starts by entering a
1690 INPUT"Enter Password please";ADF$            'password
1700 IF ADF$="peter" THEN 1710 ELSE 230

```

System file
-------------

Name	Date created	Date last used	First free sector	Last free sector	Sectors used	
Mailbase	799	799	10	9	0	11

User name	Date created	Current MSG count	Total MSG count	First sector pointer	Last sector pointer	Flag
Peter		0	1	0	0	FF

User name	Date created	Current MSG count	Total MSG count	First sector pointer	Last sector pointer	Flag
John		0	1	0	0	FF

## Mail file

[illegible]

Previous record  
Record number  
Next record

Fig 6 The mail database after both messages have been retrieved



Fig 3

```

1710 REM systems initialisation
1720 CLOSE
1730 CLS:LOCATE 15,20:PRINT"System initialisation - all previous data deleted"
1740 LOCATE 20,20:INPUT"Number of records ?";KJ
1750 OPEN "r" #1,"system.sys"
1760 FIELD#1,8 AS SYSIE%,8 AS DATEI%,8 AS DATEI%,3 AS FRESTR%,3 AS FREND%,6 AS P
PERCENT%,4 AS TOTSEC%
1770 REM
1780 LOCATE 21,20
1790 INPUT"Please enter system name (less than 8 chars)";NAS
1800 LSET SYSIE%=NAS
1810 LOCATE 22,20
1820 LSET DATEI%=DA2%
1830 LSET TOTSEC%=MKI$(KJ)
1840 LSET FRESTR%=MKI$(1)
1850 LSET PERCENT%=MKI$(0)
1860 LSET FREND%=MKI$(KJ)
1870 LSET DATEI%=DA%
1880 PUT #1,1
1890 CLS
1900 LOCATE 15,30
1910 PRINT"System initialized"
1920 CLOSE#1
1930 OPEN"r" #1,"mail.dat"
1940 FIELD#1,3 AS PREV%,30 AS PNAME%,80 AS TEXT%,3 AS RECNU%,3 AS NEXTP%
1950 REC=1
1960 CLS
1970 CNT=0
1980 LSET PNAME%="Not-used"
1990 LSET TEXT%=""
2000 LSET PREV%=MKI$(CNT)
2010 LSET RECNU%=MKI$(REC)
2020 LSET NEXTP%=MKI$(REC+1)
2030 PUT#1,REC
2040 REC=REC+1
2050 CNT=CNT+1
2060 IF REC=KJ THEN 2090
2070 LOCATE 15,15:PRINT"Initialising data areas - stand-by \\ Record no=";REC
2080 GOTO 2000
2090 LSET PREV%=MKI$(CNT):LSET RECNU%=MKI$(REC)
2100 LSET NEXTP%=MKI$(0):PUT#1,REC:CLS
2110 LOCATE 15,30:PRINT"Data area initialization finished"
2120 PRINT
2130 CLOSE #1
2140 REM user list
2150 OPEN"r" #1,"userlist"
2160 FIELD#1,30 AS DATEI%,8 AS DATEI%,3 AS CNT%,3 AS POIN%,5 AS TOTCNT%,3 AS POI
NTNT%,2 AS FLI%
2170 CLS
2180 PRINT
2190 DF=1
2200 C=1
2210 LOCATE 10,30:PRINT"User list initialization"
2220 LOCATE 20,10:INPUT"Enter user name or 'END' to exit";NAS
2230 LSET USERS=NAS
2240 LSET FLI%="00"
2250 LSET DATEI%=DA2%
2260 LSET TOTCNT%=MKI$(0)
2270 LSET POIN%=MKI$(0)
2280 LSET POINNT%=MKI$(0)
2290 LSET CNT%=MKI$(0)
2300 IF NAS="END" THEN LSET FLI%="FF":PUT#1,C:GOTO 2350
2310 IF C>19 THEN LOCATE 24,30:PRINT"Too many users":GOSUB 2380:CLOSE #1:RETURN
2320 PUT#1,C
2330 C=C+1
2340 CLS:GOTO 2210
2350 CLOSE #1
2360 CLS:LOCATE 15,30:PRINT"User directory done":GOSUB 2380
2370 CHE=1:GOTO 150
2380 FOR DLY=1 TO 150:NEXT DLY
2390 RETURN
2400 OPEN"r" #1,"system.sys"
2410 FIELD #1,8 AS SYSIE%,8 AS DATEI%, 8 AS DATEI%, 3 AS FRESTR%,3 AS FREND%,6 AS P
PERCENT%,4 AS TOTSEC%
2420 OPEN"r" #2,"userlist"
2430 FIELD #2,30 AS DATEI%, 8 AS DATEI%, 3 AS CNT%,3 AS POIN%,5 AS TOTCNT%, 3 AS
POINNT%, 2 AS FLI%
2440 OPEN"r" #3,"mail.dat"
2450 FIELD #3,3 AS PREV%, 30 AS PNAME%, 80 AS TEXT%, 3 AS RECNU%,3 AS NEXTP%
2460 RETURN

```

sector number. Also, the total sectors used field is zero, while the total sectors available field is 100.

At this point, the system points to the part of the MAIL.DAT file that can be used for storing messages. As no messages have been entered, all the data file sectors are available for text storage. The user directories are initialised by entering the user's name and setting a usage flag to 00 instead of FF. You will notice that the user directories contain additional pointers as well as counters; these are all set to zero during initialisation.

Let's assume that we have a database with a maximum of 11 sectors (as defined upon initialisation), and that one message containing five lines has been sent to a user called 'peter' and another message, four lines long, has been sent to user 'john'. The situation is shown in Fig 4.

The bottom part shows a schematic view of the MAIL.DAT file with sectors and their pointers with the necessary numbers. The first sector's 'previous sector pointer' has a zero in it, meaning that this is the first sector in the message or list. Sector five has a 'next sector pointer' filled with zero, meaning the end of the message. As this message was sent to user 'peter', the first sector pointer field in the directory of 'peter' contains the number 1, denoting sector 1 and the first sector of

the message. The last sector of this message is five and is shown as such in the directory. The same is used for the second message, except that it is four lines or sectors long and that it belongs to user 'john'.

The main file SYSTEM.SYS has the first free sector pointing to sector 10 while the last available sector points to

*Although many facilities exist today to help the user type a letter. . . or obtain a list of groceries, few possibilities exist to enhance communications needs.'*

sector 11: that is, there are two free sectors in the database.

How are all these pointers used? When the user wants to read a message allocated in directory 'peter', the system will read the first sector pointed to by the directory entry, that is '1', and shows it onscreen. The 'next sector pointer' is used to get the next sector until it contains a zero which denotes the end of the message. If the reader of the message decides to accept it, the pointers are updated as shown in Fig 5.

The directory entry for the user 'peter' is set to unused by setting the flag to

'FF'. The current counter is reset while the pointers are set to zero since no messages are in the database for the user now. The available sector count in the SYSTEM.SYS file is increased by the number of sectors contained in the message just read (that is, increased by five) while the first free sector pointer still points to sector 10 as before. However, as the program puts the sectors of the last read message to the 'end' of the SAS, the last free sector pointer now points to sector 5. Notice that in order to keep the SAS continuous, the pointers have been updated accordingly with the 'next sector pointer' of sector 11 showing 1 and the 'previous sector pointer' of sector one displaying 11. The message for user 'john' is not touched during this updating operation.

If 'john' decides to read the message as well, the pointers are further updated as shown in Fig 6. All the sectors are available, although the sequence for using the sectors in new messages changes.

Although the extensive use of pointers makes the program difficult to track, its versatility and secure database arrangement compensates for the difference. The data in the database may not only be messages, but any other form of data that must be allocated to a specific user or keys. Also, the use of SAS in the database is an efficient means of allocating sectors for data, as well as ensuring that deleted or accepted data, in the case of the mail program, is still on disk.

## Conclusion

The program does not contain any software to drive a machine's communications ports, as it is mainly intended to illustrate the techniques involved when dealing with electronic mail database design. Such software may be placed instead of the code used to get the text from the console as well as the code used to display the text. Additionally, better password protection and accounting code may be implemented for user versatility.

Many of the techniques shown in this program, especially in the case of the pointer handling, may be used in other forms of database types. Writing programs with pointers is not easy due to the large number of variables processed, however, the use of pointers in such applications permits extreme flexibility as well as additional protection in case of faults. This protection alone is worth the trouble—there is no worse error in a database than unexplained data loss.

*Program notes: the listing in Fig 3 is for the IBM PC Basic but can easily be modified to run on other machines. The program uses random files which are available with most versions of Microsoft Basic. Please note that the LOCATE command is used on the IBM PC to place the cursor at the required row and column.*

END



# Finding the way

*Tackling algorithmic problems with your micro can be fun —  
 Marcus Jeffery explains various methods of defining problems by using  
 a calculation program and mathematical functions.*

Imagine a number of plane figures, each made up of five equal-sized squares. These are the pentonimoes, 12 of which are shown in Fig 1, making up a  $6 \times 10$  square. Now write a program to find all the possible ways of arranging the pentonimoes so that they form a  $6 \times 10$  rectangle. Although writing the program may not be too difficult, the computation time is likely to be rather high with over 39916800 possibilities. This can be calculated by placing one of the 12 pieces, then one of the remaining 11, and so on, giving  $11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$ , written as  $11!$  (factorial) possible solutions. This ignores the fact that each piece may be placed anywhere on the board and each may be rotated.

## Problem-solving

Another problem with similar complexity is the Travelling Salesman Problem. Here, you are asked to plan the optimal route for a salesman who must visit a number of cities. For example, suppose you were given the map in Fig 2, with eight cities and the distances between them (Fig 3). Find the shortest possible route that passes once through all the cities and returns to the starting point. Obviously, because you have to eventually pass through all the cities, you can choose any starting point and still be sure of the shortest solution. If you now continue to measure all the possible routes and take the shortest, you're sure to get the best route. If you've done this fully, you'll have covered  $7!$  (or 5040) different routes.

The program (Fig 4) will do all these calculations for you. Rather than having reams of output, PROCprint only outputs any information when it finds a route shorter than its previous shortest possible circuit. By covering all routes, this ensures that the final output is the shortest route.

Now imagine that there are 100 cities, instead of the eight in the example. This more likely situation gives 99 possible routes, which Fig 5 shows to be quite a few possibilities. Even the fastest computers would require days, or perhaps weeks, of computation for these larger problems. One way of avoiding this might be to always consider the nearest

cities, but you'll soon discover that this does not guarantee the best solution. In fact, although other algorithms do exist for this problem, they are not much better than the method we have already used. It is thought that no efficient algorithms can ever be produced for this problem, but no-one has yet been able to prove this.

By working through the travelling salesman problem, we have been able to speculate that an optimal solution for 'a large number of cities' would take 'too long' to compute. This is, however, a little vague, and we really need a more general method for evaluating and comparing algorithms. To do this, we imagine that a particular algorithm is supplied with more and more inputs (cities in the above example) and measure the increases between the execution times. This rate of increase can then be used as a measure of the efficiency of the algorithm.

In the case of the travelling salesman problem, the route increases for 'n' cities can be shown by the function  $f(n) = (n-1)!$ . Thus, 24 routes would have to be considered for five cities, 120 routes for six cities, and so on. Other problems have functions with similar growth rates, such as  $2^n$  and  $n^n$ , all of which can be said to have exponential growth rates. Other problems, where n doesn't appear as a factor of the exponent, are said to have polynomial growth rates. Typical examples of these are  $5n$ ,  $n^n$ ,  $n^3$ , and so on. If n is sufficiently large, any exponential-time algorithm will take longer to compute than an algorithm with polynomial time. In most cases, only polynomial-time algorithms are considered fast enough to implement for general applications. This system of classification has the added advantage of being independent of the machine the algorithm is run on.

Another problem, closely related to the travelling salesman problem, that can again only be solved using exponential-time algorithms, is the Hamiltonian Circuit. Consider the graph in Fig 6. The problem is to discover a path which travels through all the nodes once, finishing at the starting node. In this particular case it is very easy: the path 1,2,3,4,5,1 will do.

Now try the slightly more complex case shown in Fig 7. If you finally give up, then I must tell you that no such circuit exists. This can easily be shown by naming the three top nodes of type A, and the five bottom nodes of type B. Then you'll realise that no node is directly connected to a node of the same type, so all routes must be of the form A to B, or B to A. We need to produce a circuit containing seven routes and finishing at a node of the same type as the start node, which is impossible. We can easily transform the Hamiltonian Circuit problem into the travelling salesman problem. Firstly, construct a 'complete graph' by connecting each point to every other point, then assign a cost to each line (the distance between the cities). The Hamiltonian Circuit with least cost is now the solution.

Let's consider a very similar problem: that of finding a route which traverses each line (as opposed to each point) of a graph exactly once, known as a Eulerian Path. A classic problem of this type is that of the Konigsberg Bridges (Fig 8). During the 18th century, the (then German) city of Konigsberg had a park built on the banks of a river. The banks were connected to two islands via the bridges shown in the diagram. The problem here is to decide whether or not a path exists which will cross all the bridges once and only once. The problem can be reduced to the graph given in Fig 9, since the size of the islands and the bridges does not really matter.

Again, the obvious method would be to list all the possible routes, starting from each of the four locations, and see if any of them met the requirement. This would be an exponential-time algorithm but would be sure of finding a route, if one existed. Unlike the previous problems, however, this one does have a polynomial-time solution. Euler was able to show that all graphs with the following conditions have Eulerian Paths:

(a) The graph must not be disconnected. In other words, it must be possible to travel from any point on the graph to any other point by following the lines of the graph.



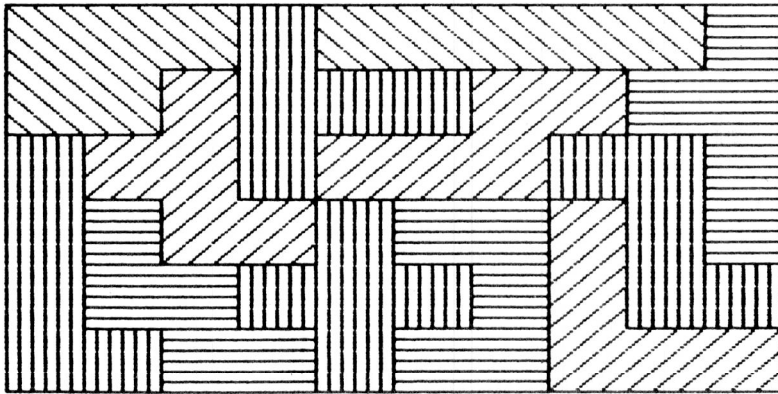


Fig 1 12 pentonimoes



Fig 2 A map showing the location of eight cities

Aberdeen							
420	Birmingham						
493	81	Bristol					
125	292	373	Edinburgh				
341	93	161	216	Liverpool			
503	105	115	378	202	London		
547	128	76	421	221	77	Southampton	
319	130	211	194	99	193	245	York

Fig 3 Mileage chart

(b) Either all graph points must be at the junction of an even number of lines, or exactly two points must be connected by an odd number of lines.

It is clear that to have a Eulerian Path, it must be possible to reach all parts of the graph as specified in condition (a). If each point has an even number of lines, it is possible to use half of them to reach the point and the other half to leave it, thus forming a path. The exception to this is where two nodes have an odd number of lines, in which case they must be the start and end points. This explains why a graph containing a Eulerian Path must meet these requirements, but Euler was able to go further than this. He was able to prove that any graph meeting these requirements must have a Eulerian Path.

Consequently, there is no solution to the Konigsberg Bridge Problem. However, if you were to take any one of the bridges away, then the graph meets the requirements and you should be able to find a path. Try testing the graphs given in Fig 10, which are of the common 'draw without lifting your pen from the paper' type.

### The Turing Machine

In the 1930s a British mathematician, AM Turing, studied these and many other algorithms. His intent was not to solve them, but to investigate which problems could be solved, and which could not. Using an imaginary computing device known as the Turing Machine, he was able to show that there are some problems for which no algorithmic solutions exist. Other problems, he was able to divide into two groups. We have already seen these: those for which polynomial-time algorithms exist; and those which can (at present) only be solved by inefficient exponential-time algorithms. However, as we have seen, it is sometimes very difficult to assign a problem to one of these groups.

The hypothetical machine which Turing devised is known as a Deterministic Turing Machine. In essence, this can be regarded as a single processor. The machine, though very simple, was able to perform any calculations currently carried out by computers. Any problems which could be implemented using a polynomial-time algorithm on the Deterministic Turing Machine could also be computed in polynomial time on a computer. In our classification of algorithms, these are said to belong to the class P (for Polynomial).

Turing then devised a slightly different machine, known as a Nondeterministic Turing Machine. This machine is quite 'clever' in that if faced with a number of possible choices, it will always choose the correct one in order to solve the problem. In some ways, this could be considered to be a machine with an infinite number of parallel processors. Whenever the machine is faced with a choice, it merely gives each possibility to a different processor. In



```

10 DIM Distance%(7,7).City$(7)
20 :
30 REM ** Read array values **
40 :
50 FOR IX=0 TO 7
60   FOR JX=0 TO IX
70     READ Miles%
80     Distance%(IX,JX)=Miles%
90     Distance%(JX,IX)=Miles%
100  NEXT: NEXT
110 :
120 FOR IX=0 TO 7
130   READ City$(IX)
140 NEXT
150 :
160 DATA 0
170 DATA 420, 0
180 DATA 493, 81, 0
190 DATA 125,292,373, 0
200 DATA 341, 93,161,216, 0
210 DATA 503,105,115,378,202, 0
220 DATA 547,128, 76,421,221, 77, 0
230 DATA 319,130,211,194, 99,193,245, 0
240 DATA Aberdeen ,Birmingham
250 DATA Bristol ,Edinburgh
260 DATA Liverpool ,London
270 DATA Southampton,York
280 :
290 REM **** Main program ****
300 :
310 DIM Visited%(7)
320 Best_Route%=9999
330 PROCvisit(0,0,1)
340 END
350 :
360 REM *****
370 :
380 DEF PROCvisit(From%,Mileage%,Number%)
390 LOCAL To%
400 Visited%(From%)=Number%
410 FOR To%=0 TO 7
420 IF Visited%(To%)=0 THEN PROCvisit(To%,Mileage%+Distance%(From%,To%),
Number%+1)
430 NEXT
440 IF Number%=8 THEN PROCprint(Mileage%+Distance%(From%,0))
450 Visited%(From%)=0
460 ENDPROC
470 :
480 REM *****
490 :
500 DEF PROCprint(Mileage%)
510 IF Best_Route%>Mileage% THEN Best_Route%=Mileage% ELSE ENDP
520 PRINT"=====
530 PRINT"Mileage: ";Best_Route%;" Route is:"
540 FOR IX=1 TO 8
550   FOR JX=0 TO 7
560     IF Visited%(JX)=IX THEN PRINT" --> ";City$(JX)
570   NEXT: NEXT
580 PRINT
590 ENDP

```

Fig 4 The calculation program

```

933, 262,
154, 439, 441, 526, 816, 992, 388, 562, 667, 004,
907, 159, 682, 643, 816, 214, 685, 929, 638, 952,
175, 999, 932, 299, 156, 089, 414, 639, 761, 565,
182, 862, 536, 979, 208, 272, 237, 582, 511, 852,
109, 168, 640, 000, 000, 000, 000, 000, 000, 000

```

Fig 5 99 is a big number . . .

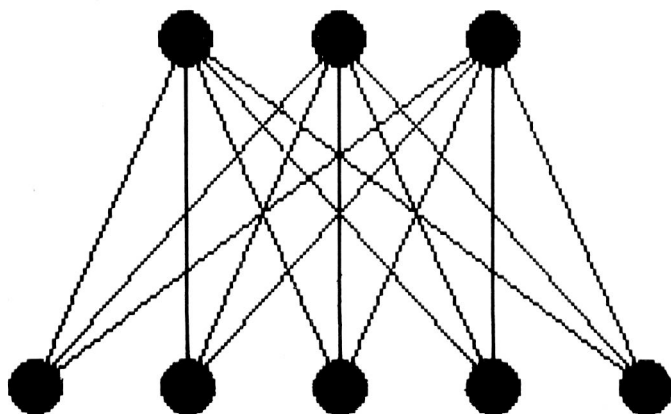


Fig 7 Does this graph have a Hamiltonian Circuit?

the end, one of the processors must find the correct solution, if one exists. For example, our travelling salesman, starting at Aberdeen, is faced with seven possible choices (the remaining seven cities). Each possibility is given to a different processor, which is then faced with six possibilities. These are also shared out, and so on, until all the possibilities have been considered. One of these processors will clearly find the optimum route because all possible routes will be considered. The problem can be completed in polynomial time on a machine of this type; thus, these problems are classified as NP (Non-deterministic Polynomial).

Unfortunately, a machine of this type could never actually be built. Although the example with eight cities would only need 5040 parallel processors, a computer capable of handling 100 cities would require more processors than there are atoms in the universe!

Based upon this classification (shown by the Venn diagram in Fig 11), it is clear that all problems in the class P are also in the class NP. In other words, all problems which can be computed in polynomial time on a deterministic machine could also be calculated on a nondeterministic machine. However, it is not necessarily the case that NP problems are also in the class P. If this were the case, then the classes P and NP would, in fact, be the same. Unfortunately, mathematicians have so far been unable to prove this one way or the other, and it is now generally thought that the two classes are indeed different. At first sight, Euler's Problem may have appeared to be in the class NP, but it has since been proven to be in the class P because it does have a polynomial-time solution. It may be that other problems, presently in the NP class, will also be found to lie in P.

Another subset of the NP class of problems is known as NP-Complete. It is often found that NP problems have some relationship to each other. For example, as we have seen, the travelling salesman problem could be regarded as finding the least-cost Hamiltonian Circuit on a graph where each point is connected to every other point.

Using a mathematical language known as Propositional Calculus, the mathematician SA Cook was able to describe the workings of a Nondeterministic Turing Machine. From this, mathematicians have been able to show that a number of NP problems are special in that they can all be converted to a common problem in propositional calculus. What's more, this conversion is in polynomial time. It follows from this, that if a polynomial-time solution to any of the NP-Complete problems could be found, then it could be used to solve all NP problems.



## Solutions

This theory is all very clever, but not much help to the poor computer scientists who still have to implement these problems. Consequently, many methods of finding sub-optimal solutions have been developed. These are usually of two types, both of which have the advantage of being computable by polynomial-time algorithms.

The first type are those that guarantee solutions near to the optimal in all cases. For instance, the travelling salesman problem has already been demonstrated to lie in the class NP (unless you can prove differently, of course!), so a number of sub-optimal solutions are used. One technique is guaranteed to provide solutions which are no more than twice the optimum length. This process is shown in Fig 12, and consists of the following steps:

(a) Generate a Minimum Spanning Tree to connect the cities. This is done by connecting the closest cities, then the next closest, and so on, but a connection is only made if the city is not already connected to the graph.

(b) Each of these lines is then traversed in both directions to form a cyclic route.

The Minimum Spanning Tree, which is generated in polynomial time, is known to be shorter than the length of an optimum tour. This can easily be seen by finding the optimum tour (using the program in Fig 4), then omitting any one of the lines. This will form a spanning tree of shorter length, so the minimum spanning tree must be shorter than any possible tour. Consequently, traversing this tree in both directions will give a tour which is less than twice the optimum. The tour shown in Fig 12 (b) can then be further improved by taking short-cuts. This is done where cities are visited twice (that is, in both directions), where the two lines travelling in one direction can be reduced to one line which bypasses the city.

Techniques also exist which will give solutions to the majority of problems. This type of solution arises because in most practical cases the problems are not the worst cases. For example, if you were given the city layout shown in Fig 13, the shortest path is fairly obvious without having to work through the  $15!$  possible routes. For large maps, one typical method is to divide the map into a number of territories, calculate a route for each, then join the territories. If, for example, a map contained 26 cities, an exhaustive search would be required to check  $25!$ , or  $1.55 \times 10^{25}$  (approximately) possible routes. If this map were split into the areas, as shown in Fig 14, then an exhaustive search of each area would only have to analyse  $3! + 4! + 3! + 4! + 3! + 3!$ , or 72 possible routes. Another algorithm is then known to connect the areas together in polynomial time.

Many other problems exist for which only NP solutions are known. How

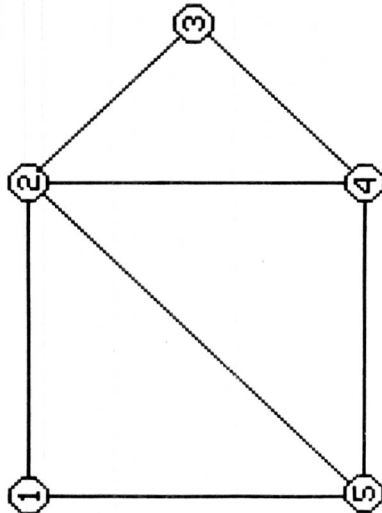


Fig 6 A Hamiltonian Circuit graph

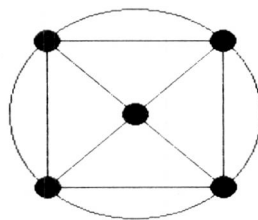


Fig 10 Graphs to test Euler's Problem

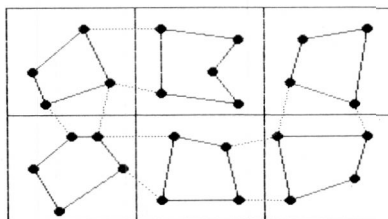


Fig 14 A map of 26 cities split into areas

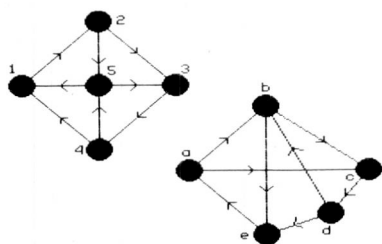


Fig 15 Isomorphic graphs

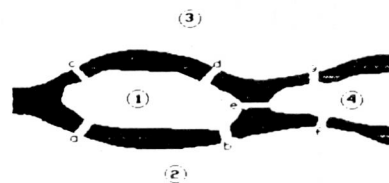


Fig 8 The Konigsberg Bridges

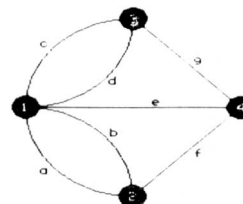


Fig 9 Euler's Problem

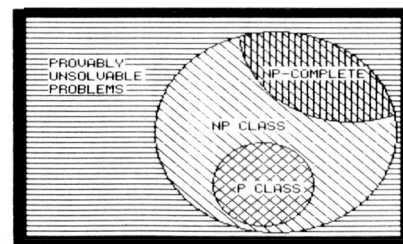


Fig 11 A Venn diagram

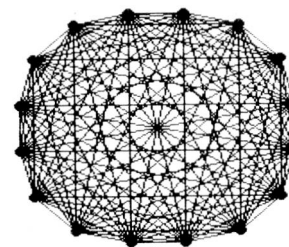


Fig 13 A city layout

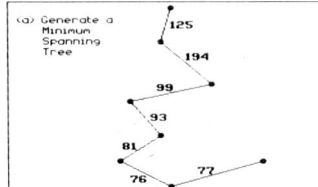
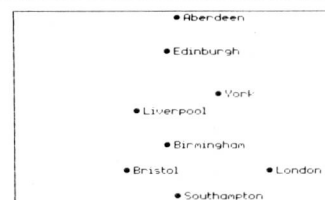


Fig 12 A process to provide solutions of no more than twice an optimum length



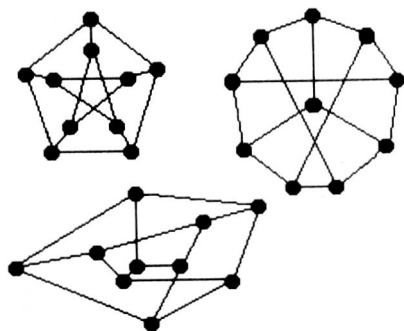


Fig 16 Are these graphs clearly isomorphic?

many colours are required to colour a given map, such that no two adjacent areas have the same colour? It is fairly easy to see if a map can be coloured by one or two colours, and it was known for many years that five colours were sufficient to colour any map. However, no-one has been able to produce a map requiring more than four colours, and it was recently proven that four colours were indeed sufficient. However, choosing between three and four colours is still an NP problem. Look back to the pentonimoes in Fig 1. They have been coloured using four shades, but

can they be coloured using only three?

The Knapsack Problem involves placing a number of objects into a knapsack without exceeding the capacity of the knapsack. Each object has a weight and profitability; the idea being to find the best possible combination of objects which maximise the profit. The exhaustive solution would require picking each of the original objects, followed by any of the remaining objects, and so on.

Two graphs are said to be isomorphic if there exists a direct mapping between the points and lines in each graph. To see this more clearly, consider the two graphs shown in Fig 15. Although appearing dissimilar, they are isomorphic, and graph A can be transformed into graph B by changing the following points:

1 = c, 2 = d, 3 = e, 4 = a, 5 = b

It is possible to reduce this problem using some techniques. For example, if the graphs are isomorphic, then they must have an equal number of points and lines, and each point must have the same number of lines emanating from it. Many other techniques exist which will work with specific types of graph, but the best general solutions still take exponential time to compute. Is it clear that the three graphs shown in Fig 16 are isomorphic?

## Conclusion

A multitude of other problems exist, but let's finish by considering a problem of particular interest to computer software designers.

Imagine a multi-tasking computer system with three independent processors, each of which is capable of handling any particular job. Imagine that the three processors are given the tasks shown in Fig 17. If, each time a processor became free, it just took the next available job in the queue, then the overall finish time would be 11 units. However, by using a system known as LPT scheduling (Longest Processing Time) the overall time can be reduced to nine time units, which in this case is also the optimum. Using the LPT rule, whenever a processor becomes free, it will always take the job with the highest processing time.

The LPT system will not always produce an optimum ordering but it can be implemented using a polynomial-time algorithm, whereas an exhaustive search would be in exponential time.

Many problems which may appear to be quite difficult can be solved using such techniques as Divide-and-Conquer, Dynamic Programming, Backtracking, and Branch-and-Bound. But some problems defy all the best efforts to find polynomial-time solutions. It is these, and especially those lying in the NP-Complete class, which pose the real questions. Is NP identical to P? **END**

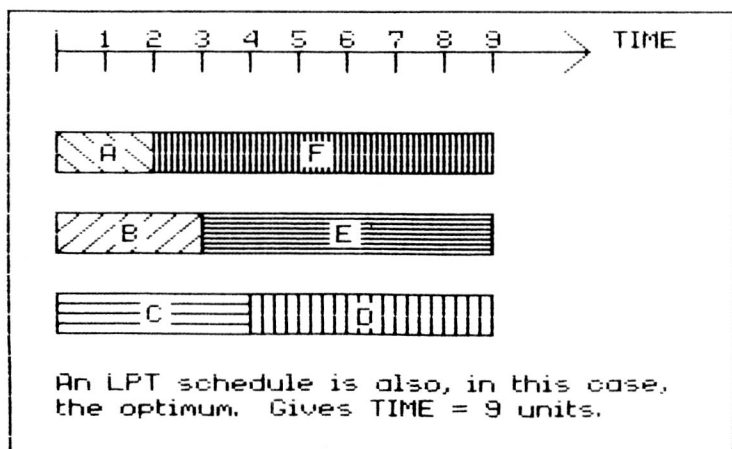
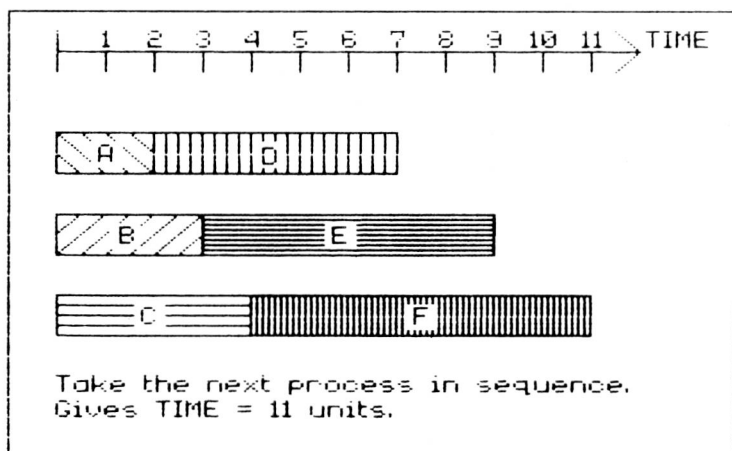
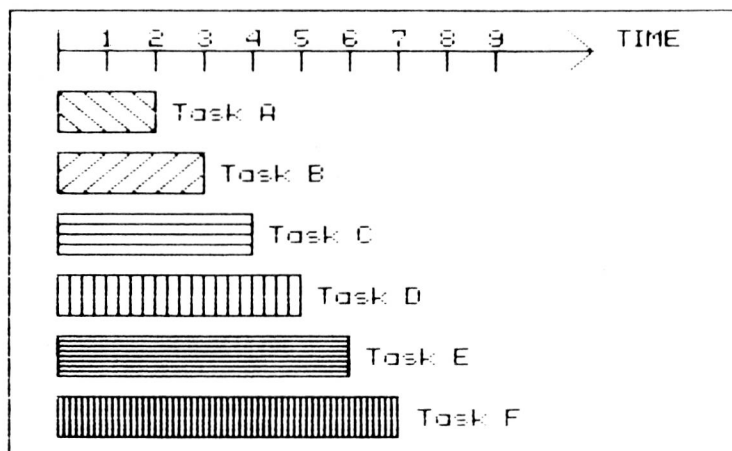


Fig 17 Tasks for a multi-tasking computer system with three processors



FOR IBM  
and APPLE II/III

# ONE SPREADSHEET TO START ON. ONE TO GROW ON.

## Introducing The VisiCalc® Package.

Here are two powerful spreadsheet programs in one package—VisiCalc, the standard by which all other spreadsheets are judged, and VisiCalc Advanced Version, a second generation spreadsheet for advanced users. These two programs allow you to begin with a basic spreadsheet program and later move on to a more advanced spreadsheet as your business and home needs grow.

VisiCalc is the perfect tool for the single disk-drive Apple //c personal computer. Six home budgeting and planning applications have been programmed into the spreadsheet.

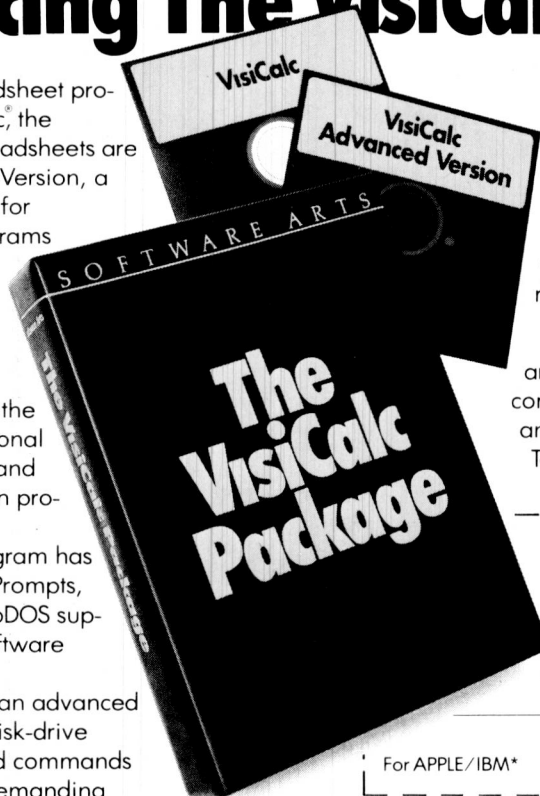
This original spreadsheet program has been upgraded with Full Word Prompts, Variable Column Widths and ProDOS support to make the best known software program ever, even better.

VisiCalc Advanced Version is an advanced spreadsheet program for dual disk-drive systems. It contains sophisticated commands and functions to handle more demanding

applications. Plus, an on line Introductory Guide to help you easily understand the program's capabilities.

Some of these advanced functions include Keystroke Memory™, On line Context-Sensitive Help, and Print Commands for Presentation-Quality reports, among others.

And if two great spreadsheet programs aren't enough, The VisiCalc Package comes with comprehensive documentation and **The VisiCalc Book** by Donald H. Biel. To find out more simply clip the coupon.



Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

Postcode \_\_\_\_\_

For APPLE/IBM\* (\*delete as necessary)

PCW 6.85

### Software Arts™

43 Buttermarket, Ipswich, Suffolk, England, IP1 1BJ  
Tel: Ipswich (0473) 221551/213187 Telex: 98501 SAINT G





## SCREENTEST

# Microsoft Word

*Word, Microsoft's word processor, has at last found a machine to complement its very individual features — the Macintosh. But is it a perfect marriage? Kathy Lang finds out.*

Among the packages available on the Mac, Microsoft's Word is rare in having been available for quite a while, rather than being specially written. Yet, in some respects, Word could be said to have been waiting for just such a machine to come along — many of its features are beyond the capacity of most hardware to provide a structure which will make them as appealing as they deserve. For example, Word provides the ability to use a wide variety of fonts and font sizes, and to display these on the screen, but few systems can match this functionality.

In other ways, the Mac might have some drawbacks as a word processing system: the keyboard has a very hard feel, more like an old-fashioned terminal; the screen is rather small for comfortable word processing; and there are no special function keys other than the mouse.

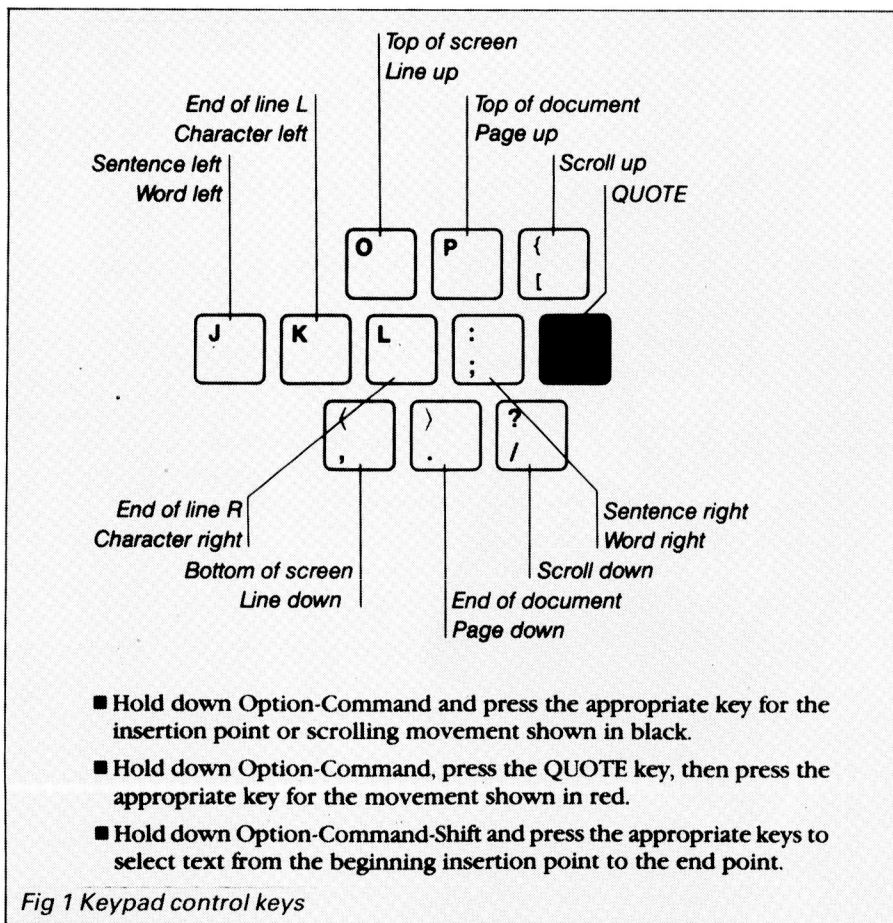
### Editing

When you first load a document into Word, the display shows the main Word menu names across the top, and a conventional Mac window across the screen showing horizontal and vertical

scroll bars plus the name of the document being edited. No ruler is displayed unless you request it, nor are there any indicators of horizontal or vertical position such as line number. The page number is shown, but may be inaccurate unless you have recently revised the pagination.

Unlike the majority of systems on which Word is available, the Mac has only the mouse with which to move the cursor—there is no conventional arrow key pad with the system. This could mean that professional touch-typists would spend a lot of time moving their hands from keyboard to mouse and back. To get round this, Word allows you to use a system of key combinations based on the Command Option keys; Fig 1 shows the table from the Word command key summary. Despite my years of acquaintance with the alleged horrors of WordStar control keys, I found it easier and quicker to use the mouse (except for scrolling long distances), but with practice the key layout should become familiar. No stickers are provided to aid memory. With either system, it is reasonably quick and easy to move the cursor (which Word calls the insertion position because it dictates where text will be inserted). If you prefer to overtype, you must first select the words to be overtyped, and then enter the replacement text.

This approach to text selection is used extensively to control the action of a variety of tasks — deletion, emphasis, copy, movement to another part of the document via the Clipboard, and so on; this can be done either with the command key combinations I have mentioned, or with the mouse. While I dislike the use of mice in a context where you are doing a lot of keyboard entry, it does provide a direct approach to movement, comparable with cursor controls in other environments, and it proved easier than I expected to locate





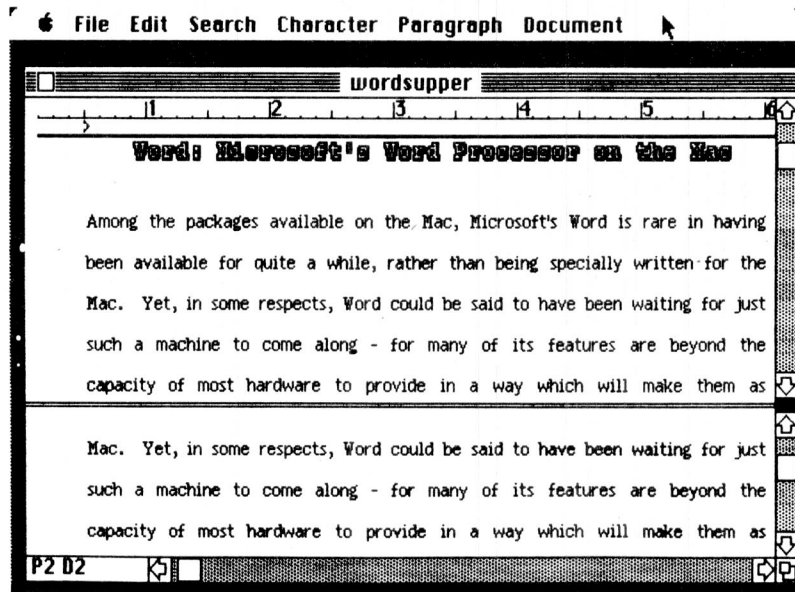


Fig 2 Display of two parts of same document, using split window

the cursor exactly. It also means that you can use one technique across the whole range of Mac packages.

The one thing which did annoy me about editing with Word keys — or rather with Mackeys — was the position of the SHIFT key. Haven't we suffered long enough from IBM's idiocy in placing it in defiance of the typewriter conventions? It's not Microsoft's fault — but it is something you should bear in mind when considering word processing on the Mac.

Word provides other editing features in a sensible, easily-used way. You can search for specified words or phrases, and replace them if necessary; you can choose to ignore case, to look for complete words only, and to replace just one or all of the matching strings of characters. To copy information between documents, one approach is to use the Clipboard, which is preserved between applications and between editing sessions, and can hold a lot of information — how much depends on the amount of space on your system disk. An alternative is to set up two windows, one containing the source document and the other the target, and copy between them, again via the Clipboard, but without the need to close your current editing session between marking and copying.

Word is reasonably forgiving of errors: for example, the most recent action can be reversed with the undo key, and a backup copy of each file will be kept automatically on request. Text which is cut (either for deletion or for copying elsewhere) goes into the Clipboard, from whence it can be retrieved if you find you have made a mistake, provided you have not subsequently done another cut since Clipboard can hold only one.

Word provides a glossary facility to store frequently-used text, so that it can be recalled using an abbreviated name. The procedure for recall is to type the

name of the abbreviation and press COMMAND and BACKSPACE, so even with single-letter names it's not a procedure you would use for very short words. Nor did there seem to be a way to include Word command sequences in the glossary — it is strictly a text storage medium. On the other hand, display attributes, including font and emphasis, are not only stored with the abbreviation, as they should be, but also remain in force when recalled, until the previous setting is restored. I was doubtful as to whether that would be my preferred option. Probably the best approach would have been to allow a choice when the abbreviation is first entered into the glossary.

### Text formatting

Word provides a good range of text formatting options, either by using a ruler or specifying margins and indents through 'dialogue boxes' (question-and-answer displays). If you use the dialogue route, you can specify formats

in a variety of units — the default is inches and decimal portions thereof, but you can choose centimetres, point, or 10 or 12 pitch if you prefer. Formats can be preset before you start to type, or they can be changed later by selecting the text to be affected. Indents can be absolute, or relative to the most recent indent; you can indent just the first line of a paragraph, or have hanging indents with all but the first line indented. If you insert text into existing material, the paragraph will be realigned as you type. This is good for authors when creating text but not so good if you are editing from a printed draft, since the reformatting throws away the visual match between the printed and displayed versions.

Rulers and formats are stored with the document, and are automatically activated as you move between different parts of the document. It isn't usually possible to tell in advance what changes will take place, though, since Word doesn't automatically display rulers or show when they change, nor are other markers such as carriage returns at the ends of paragraphs automatically displayed. All these markers can be displayed if you wish — I left the ruler displayed so that I could anticipate changes of layout — but you can't really leave the display of carriage returns set, as with it comes the display of spaces that you've typed. You can inspect line endings as they are displayed; Word doesn't offer any help with hyphenation, but you can inset 'soft' hyphens to split over-long words.

Tables can be implemented using tab markers set in the ruler; tab characters are actually inserted into the text, so if you want to change the format of a table, all you need to do is select it, change the tab positions, and Word will do the rest. Tabbed fields can be left or right aligned, centred, or aligned on the decimal point for numeric fields. You would be most likely to feel the drawback of the narrow screen when typing tables: you can display six

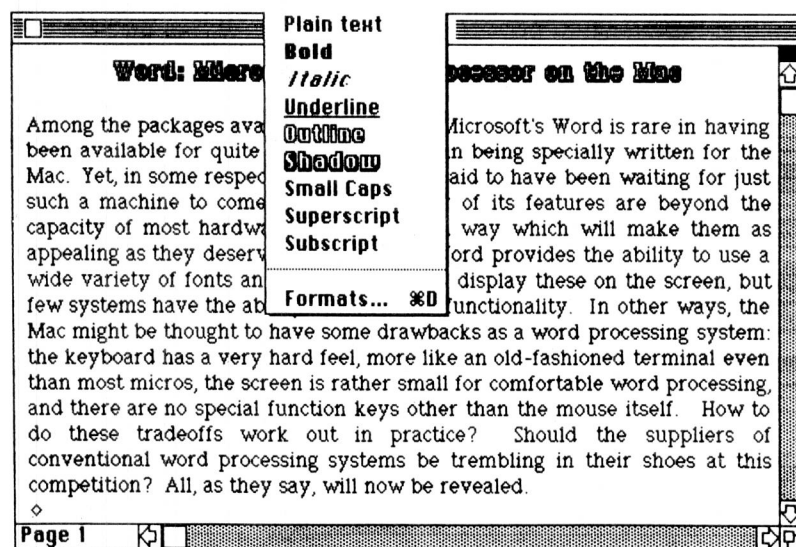


Fig 3 Pull-down menu of character styles



inches worth of text, so for most ordinary documents the whole line would be displayed. But for wide tables, especially those to be printed on paper inserted sideways, part of the table would extend well beyond the width of the screen.

One of Word's strongest features is its ability to display and print text in a wide variety of character sets, with several different fonts for each set. These are displayed on the screen as they will print, as are emphasis (which includes bold, underlining, two forms of shadow print, and small capitals), justification, centring, and the layout features I've already mentioned. Indeed, Word is about as WYSIWYG (what you see on the screen is what you get on the printer) as it is possible to get. With such a wealth of goodies, it seems churlish to argue that you can take WYSIWYG too far, but it's true.

The trap into which Word falls is to include line spacing in its WYSIWYG approach — if you request double-spaced lines, then that is what you get on the screen. Given the limitations of a screen display, there is very little text shown. I got round this by using single-spacing until my document was complete, then changing to double-spacing before paginating, but that doesn't help much if you subsequently need to make further changes.

The line-spacing features themselves are also rather patchy. If you want either single or double-spaced text, then whatever font you use, Word will adjust the line heights correctly. If you need other spacings, you are on your own — you have to adjust the line height to an appropriate unit, taking into account the font(s) you were using. It's good that this capability exists — too many packages are getting 'bossy' in this area — but the provision of one-and-a-half spacing as a third option would save a lot of grief.

Pagination may be left until print time, or explicitly requested so that you can see where page breaks will occur. Word attempts to avoid widows and orphans by ensuring that you will not have just one line of a paragraph printed alone on a page, but this method cannot prevent headings being separated from text where a blank line intervenes. To avoid this, you can insert

## SCREENTEST

mandatory page breaks, or use instructions to 'keep the next n lines together'. Page-breaks are shown on the screen with remarkably discreet equal signs in the left margin — I found them quite hard to spot at first.

You can set up running headers and footers in your text, and change them at will; these may include page numbers which are updated automatically. Word copes with changes of page formats by separating your document into 'divisions', each with its own page format-

contract work, such as conveyancing or personnel records. The ability to store such abbreviations, either for the duration of the session or permanently on disk, and to have a number of separate glossaries on disk, gives a reasonable degree of flexibility.

For repeated text of a different kind, Word has a mailmerge feature. This allows you to set up a standard document such as a letter, specify the points within it which are to vary according to the recipient, and merge this letter with a set of variables for each recipient. The information to be merged can be created within Word, or it can be brought in from outside, for instance from a file written by the File data management system reviewed on page 198 of this issue. You can include the ability to request information, such as a date, at the time the letter and data documents are merged, and you can

Fig 4 Dialogue box for layout of headers, footers and page numbering

ting. You can have one for the whole document, or several within a document. Provisions for formatting within a division are very flexible. They include the ability to have true footnotes, which may be printed either on the same page as the reference or at the end of the division.

### Repeated text

The glossary features for handling abbreviations within documents should be adequate for most needs, where it is necessary to directly include the text in the document. For example, this feature could be used for standard

specify the inclusion of other documents within the template. You can also include tests to give optional inclusion of parts of the template: for example, you might have varying degrees of severity in a letter requesting payment of overdue accounts, choosing the paragraph to use with a test for the length of time the debt was owing.

### Goodies

The basic features Word provides are quite powerful, but there isn't a spelling checker, nor are there other, more esoteric, extras such as indexing. On the other hand, you can import pictures

Fig 5 Paragraph formats dialogue box

Fig 6 Part of the help menu



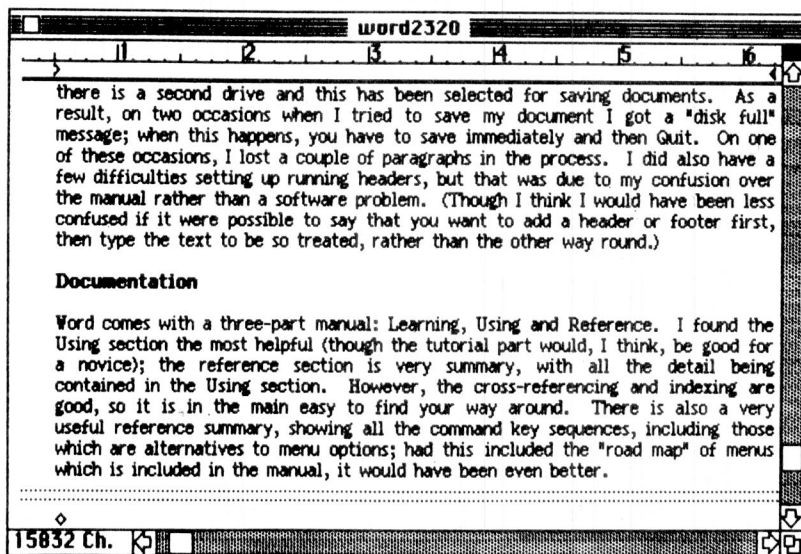


Fig 7 Text displayed, the diamond indicates end of document

and tables from Chart and Plan, and reports and sets of records from File. You can export text such as tables to other packages, and in File these can be incorporated as valid File records if you use the correct Word format.

### In use

Word uses a combination of pull-down menus in the standard Mac mode, mouse movements, and command key sequences. In many cases, command key sequences can be used instead of menu options or mouse movements, so that touch-typists with good memories can keep their hands on the keyboard most of the time.

The marriage of hardware and software in handling character and font display is excellent. Indeed, in almost every respect except the lack of an index, Word with Mac would be an excellent combination with which to produce a book — and with a good printer, camera-ready copy could be of a very high standard. The Apple Imagewriter has three modes, fast draft, medium, and high-quality, and the

high-quality output would probably be adequate for most requirements. It is also possible to attach a variety of daisywheel printers to Word on the Mac, including a Diablo model and Apple's own, but not, as yet, the IBM Quietwriter. The drawback with a conventional daisywheel would, of course, be that you would spend a lot of time changing daisywheels if you wanted to take full advantage of Word's ability to handle many different character sets and fonts.

The only area in which I had potentially serious problems was in the handling of work file space. The Word disk as distributed is very full; you can remove a few things like extra printer drivers, but unless you remove the Mac Finder with its attendant useful facilities, you can't get much free space on the Word disk. On a two-drive system this shouldn't matter, but Word uses the system disk for work files, even where there is a second drive and this has been selected for saving documents. As a result, on two occasions when I tried to save my document I got a 'disk full'

message; when this happens, you have to save immediately and then quit. On one of these occasions, I lost a couple of paragraphs in the process. I also had a few difficulties setting up running headers, but that was due to my confusion over the manual rather than a software problem.

### Documentation

Word comes with a three-part manual: Learning, Using and Reference. I found the Using section the most helpful (although the tutorial part would, I think, be good for a novice). The reference section is very summary, with all the detail being contained in Using. However, the cross-referencing and indexing are good, so it is, in the main, easy to find your way around. There is also a very useful reference summary, showing all the command key sequences, including those which are alternatives to menu options; had this included the 'road map' of menus which is included in the manual, it would have been even better. The

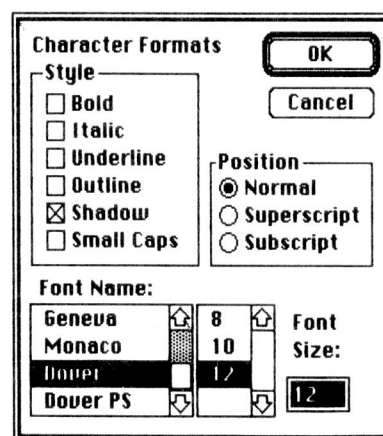


Fig 9 Character formats dialogue box

onscreen help is good, and is provided in the usual Mac fashion of pull-down windows which overlay the current text. It is possible to move the help into a part of the screen where you can see it while you carry out the task — other suppliers please copy!

### Conclusion

For professional word processing — by which I mean the production of long documents, tables and personalised letters, in contrast to occasional use for short letters — Word has a lot of advantages and few drawbacks. The chief of these is the lack of a spelling checker (you may also dislike the fact that it is copy-protected). For documents with a variety of character formats and fonts in particular, Word could be invaluable if your printer could cope, too. On the Mac, you would have to balance the excellent match of hardware and software as far as screen display, the neatness of the menu system and the direct pointing of the mouse is concerned, against the hard feel of the keyboard and the absence of function keys.

END

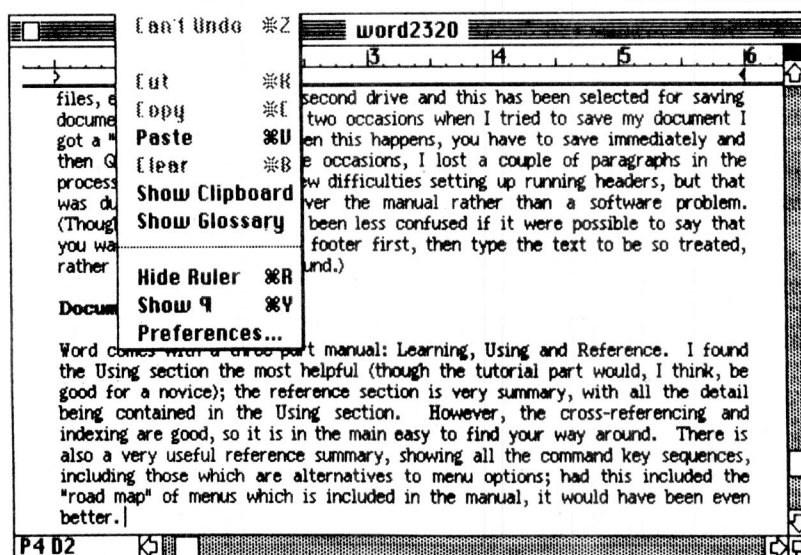


Fig 8 Document screen with current ruler plus pull-down edit menu





## SCREENTEST

# Microsoft File

*Kathy Lang looks at Microsoft File, a data management system for the Macintosh with a very visual approach.*

In the months since the Macintosh was launched, a major criticism has been the lack of 'serious' business software. The announcement of the availability of four Microsoft packages for the Mac — File (data management), Word (word processing), Chart (business graphics) and MultiPlan (spreadsheet) could be expected to make some dent in those criticisms. I thought it would be informative to put the data management package through its paces in just the same way as I evaluate its competitors, in order to ascertain whether the accusation of 'executive toy' can be rejected once and for all. (Word is reviewed on page 194 of this issue.)

File stores each set of records in a single 'flat' file, with no direct connections between files. Each record in a file must have the same structure, but data is stored in variable length fields. (That means it uses only the amount of space needed to store the information actually present — you don't have to allow the maximum amount that might ever be needed. In fact, the news is better than that: you are not *obliged* to specify the field lengths at all.) Extensive use is made of the Mac's facilities for drawing on the screen, but these are exploited more by way of allowing you to alter File's initial predispositions than by the true paint-a-screen approach more common on conventional screens. Frequently-used fields can be indexed for fast access and permanent ordering, and the index is kept up-to-date. Records can also be sorted in other ways for display or printing, although sort order is not maintained when records change, or across sessions of using File. The reporting features are good, but do not include a letter-writer — you must link to Word for that.

### Constraints

The major constraints and functions of File are shown in Fig 1. Within the limits

of the functions it provides, File's constraints are very few. The maximum size of character field is a massive 32767; since, however, a data file cannot span a disk, the practical limits on field, record and file sizes will be the size of a disk (which must have space not only for the data file, but also for associated indexes). Data validation is limited to checking the type of data entered.

### File creation and indexing

Data files are set up by specifying their format; the minimum to be specified for each field is the name and type. (You don't need to specify length of field — File has no concept of length in the conventional sense, in that you can hold any number of characters in any field up to the maximum of 32767, and the only thing you can vary is the number of characters *displayed*.) Field

type may be character, number, date or picture — this last is usually used as an adjunct to the more usual data types rather than to store data itself, since the pictures such fields hold have to be imported from other packages such as MacPaint or Chart, and cannot be edited within File. For date fields, there are three options: the short option uses the American numeric convention of MM/DD/YY, the other two use three-letter abbreviations for the month name. Numbers may be shown in a variety of formats, including currency, percentage and scientific notation. Fields may also be computed from the values of others, using arithmetic operators and brackets. When you have finished setting up the record format and have left File, even if you have not yet entered any information, you can't change field types or make an existing field into a computed field. You can, however, add

The screenshot shows the Microsoft File application window with the menu bar: File Edit Form Organize. The main window displays a list of records for a file named PCWBT223. The records are organized in a table with columns: REFNUM, ATEC, NAME, TYPE, SCR, SUPP, PRICE, and BU. Below the list, there is a 'Report' section with a 'Preview' button and a 'Summary Report' checkbox. The 'Sort' section shows 'Not Sorted' and a 'Heading' section with columns: REFNUM, NAME, TYPE, SUPP, PRICE, and BU. The 'Field' section shows the same columns. The 'Grand' section is empty.

	REFNUM	ATEC	NAME	TYPE	SCR	SUPP	PRICE	BU
1	24BAB		BAB	BAL		1,213	153	
2	24BAC		BAC	CAL		2,223	153	
3	24BAD		BAD	DAL		3,233	153	
4	24BAF		BAF	FAL		4,243	153	
5	24BAG		BAG	GAL		5,253	153	
6	24BAH		BAH	HAL		6,263	153	
7	24BAJ		BAJ	JAL		7,273	153	
8	24BAK		BAK	KAL		8,283	153	
9	24BAL		BAL	LAL		9,293	153	

A File record in List view plus a window showing a Report creation form



PCWBT223

Form

0 REFNUM: REFNUM DATECRE: DATECRE  
NAME: NAME TYPE: TYPE  
DESCRIP: DESCRIPN

1 SUPP1: SUPP1 PRICE1: PRICE1 SUPP3: SUPP3 PRICE3: PRICE3  
SUPP2: SUPP2 PRICE2: PRICE2 SUPP4: SUPP4 PRICE4: PRICE4

2 SYS1: SYS1 REF1: REF1  
SYS2: SYS2 REF2: REF2  
SYS3: SYS3 REF3: REF3  
3 RATING: RATING REF4: REF4

iew 1

A File form; the shaded area is selected

or delete fields or alter their display formats, even after data has been entered, just by amending the record format.

You can, if you wish, specify a variety of display attributes for each field, as

Maximum file size	65,535 rec
Max record size (ch)	NS-at least
	32767
Max no fields	1023
Max field size	32767
Max digits	NS
Max prime key length	NS
Special disk format?	N
File size fixed?	N
Link to ASCII files?	YF
Datatypes	N,C,D,Pic
Fixed rec structure?	Y
Fixed record length stored?	N
Amend rec structure?	Y
Link data files?	N
No data files open	NA
No sort fields	Nine
No keys	NS
Max key length (chars, fields)	NS
Subsidiary indexes kept up-to-date?	UTD
Data validation	Ave
Screen formatting	PAS,Def
Unique keys	No
Report formatting	PAS
Store calculated data	In
Total & statistics	Stats
Store selectn criteria	N
Combining criteria	A
>1 criterion/field?	Y
Wild code selection?	SW
Browsing methods	AF
Interaction methods	M
Reference Manual+	***
Tutorial Guide+	****
Reference card+	*
Online help+	****
Hot-line?	D

Fig 1 Features and constraints

well as indicating that the field should be indexed. Initially, two record display formats are created for each data file: a List format showing one record on each line of the screen; and a Form which shows one record per screen. You may manipulate these and create others. Setting up a new data file is therefore very easy and very quick, provided you adhere to the standard approach.

### Data input and updating

Data can be entered in either the List or the Form format. In either case, data entry is very similar to that used in more conventional systems — you use the TAB key to move from one field to another, entering data as you go. If you don't need to add data to every field, you can use the mouse to activate just those fields which you do need to enter. Finding a place to enter a new record into a large file could be rather tedious

— according to the manual, you must scroll to the end of the data file. However, if you call up the Form view of a record and press BACKSPACE before anything else, you are presented with a blank record which is flagged 'new' in the margin. This isn't mentioned in the manual — I found out by accident!

Where data is repeated, you can copy fields between records automatically; you can also cut or copy records into the Mac's Clipboard, and paste them into another part of the data file. The same approach is used to transfer records between files, either within File or to other packages such as Chart.

All data amendment is done directly from the keyboard — there don't seem to be any facilities for automatically updating records in a batch, for example to increase a group of prices by 10 percent.

### Screen display

File provides two kinds of format for displaying records on the screen when adding or amending information. The basic format is a List, with one record per line; this is used when the rather quaintly-named 'List Helper' is active. This is, of course, most useful for records with relatively small amounts of information, but File exploits the Mac facilities for manipulating the screen display in a way which enables you to get the most out of this approach.

The List format initially shows each field in the record, using the display length specified (or defaulted to) when the file was set up. You can modify the List by hiding individual fields in a separate area of the screen, by reducing the display of a field to just one or two characters or moving it 'behind' other fields, and by highlighting some fields but not others. The real power of these features, however, comes into force when you use them to manipulate the alternative display format, which shows one record per screen.

PCWBT223

Form

1 REFNUM: 24BAD NAME: BAD DESCRIP: ATECRE: TYPE: DAL

SUPP1: 3,233 PRICE1: 153 SUPP3: 0 PRICE3: 0  
SUPP2: 0 PRICE2: 0 SUPP4: 0 PRICE4: 0

SYS1: REF1: DALBAD  
SYS2: REF2:  
SYS3: REF3:  
RATING: AB REF4: ZZZZZZ

17/1001

A File pull-down menu for retrieving sets of records





## SCREENTEST

Initially, the one-per-screen form displays each field on one row, with the label preceding a box containing space for the data value. You can use the mouse to shorten or lengthen field name and value boxes, and move them around the field singly or in groups. Groups don't need to be contiguous initially, you can select several separate boxes to form a group. Field captions can be extended, and, if you have set them up in the Clipboard in advance, pictures from Chart or MacPaint can be imported to go with your field placings to aid the ultimate form-filler or just generally make the screen look more attractive.

You may have several display formats for different purposes, and each can display a different group of fields in a variety of ways. One of these formats will be saved with your data file and used whenever you request the Form view of your data, while the others need to be explicitly requested from the File pull-down menu. Switching between the Form and List views of your records can be done in several ways, mostly involving just a single key or mouse button depression. (The Form view you switch to should be the one saved with your data file. I had a problem with that — I originally saved my data with a default Form format, and subsequently modified the form and saved it with my data file. Thereafter, when I loaded the data file it came up correctly with my own Form view, but when I switched to the List form and back I always got the default format of Form.)

Fields which are not to be displayed can be 'hidden', but there did not seem to be a way to prevent any user modifying the form to restore these hidden fields. You could not, therefore, use that method to provide partial access to a file containing a mixture of secure and public information.

### Printed reports

Formatted reports can be printed, or displayed onscreen in Preview mode; you can have full reports which include data field values, or just summaries which contain totals and statistics — a very useful feature. Reports are formatted using similar features to those provided for organising your own screen formats. All the fields are displayed onscreen; you select those you want to print and use the mouse to drag them to the correct positions on the report. File can provide a count of records, plus average, minimum, maximum and standard deviation of numeric fields, as well as totals, and sub-totals by items which have been specified as sort fields. Sorting can take place as part of the reporting operation. Layout features include headers and footers, and the inclusion of page numbers and current date and time.

When you have set up a report format, you can save it alone (so that it can be used with more than one data file), with the data file, or jettison it. You can also save the complete report in a file for subsequent inclusion in, say, a Word document.

### Selection & sorting

To find individual records or sets, you use the Find option from the Organise menu. Once checked, this displays a version of the record form onscreen, allowing you to enter values against

*'I spent hours playing with my forms and reports to get them "just right", and thoroughly enjoyed doing so.'*

which records are to be tested. You can test for a field being equal to or starting with a single value or with one of several values, for a field being less than, greater than or not equal to a single value, or within a range of values. Wild codes are available for both single characters and groups of characters. You can apply tests to several fields in the same selection operation, but you have no choice about how the tests are combined — every test must be passed for the record to be selected. File shows the number of records which pass the test, and then displays the first record of the set selected. Thereafter, until you activate the Select All Records option, all actions such as sorting operate on this subset of records.

A file can be sorted on up to nine

fields, in ascending or descending order. Sort order is maintained only for the current session, or until records are added or deleted; ordinarily, records are displayed in order on the first indexed field.

### Calculation

Calculated fields are available when data is input, and you can aggregate values when reporting. Apart from these facilities, there are no special calculation facilities in File.

### Advanced facilities

File does not provide the ability to set up permanent links between files, nor are there any programming-like features for tailoring the way the system works to particular applications.

### Links with outside

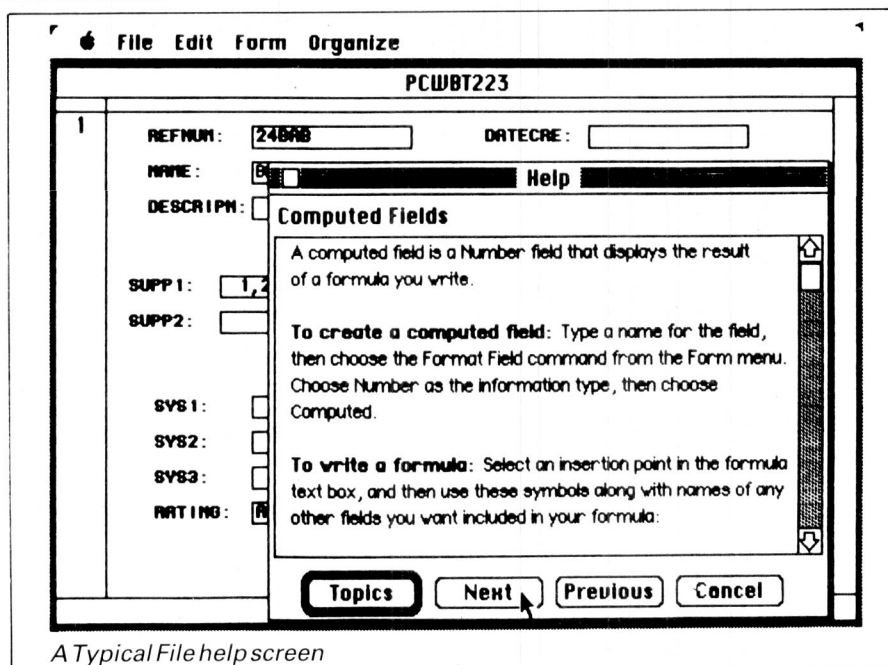
File can read and write files in ASCII format, using a simple but fixed layout with a TAB character between each field and RETURN at the end of each record. You can import pictures from Chart and MacPaint, and spreadsheet tables from MultiPlan, and export records to these packages via the Clipboard. This is a scratchpad area which is normally entirely in memory, but which, if it gets too large, is written out partly to the system disk (although that may not help much — on my File disk, there was only 13k available). I couldn't discover what the precise limits on the size of Clipboard are: it would, of course, depend on how much memory your Mac has, as well as how much memory File uses. (On the 512k Mac I used, 88 per cent was free when File was loaded with a single record being viewed.)

Information can be passed between Word and File either via the Clipboard, or through files. Reports can be saved in text files for inclusion in Word documents. Records saved in the standard export format can be merged with Word template documents to give personalised letters, and tables created in Word using tabs to separate columns can be imported into File data files.

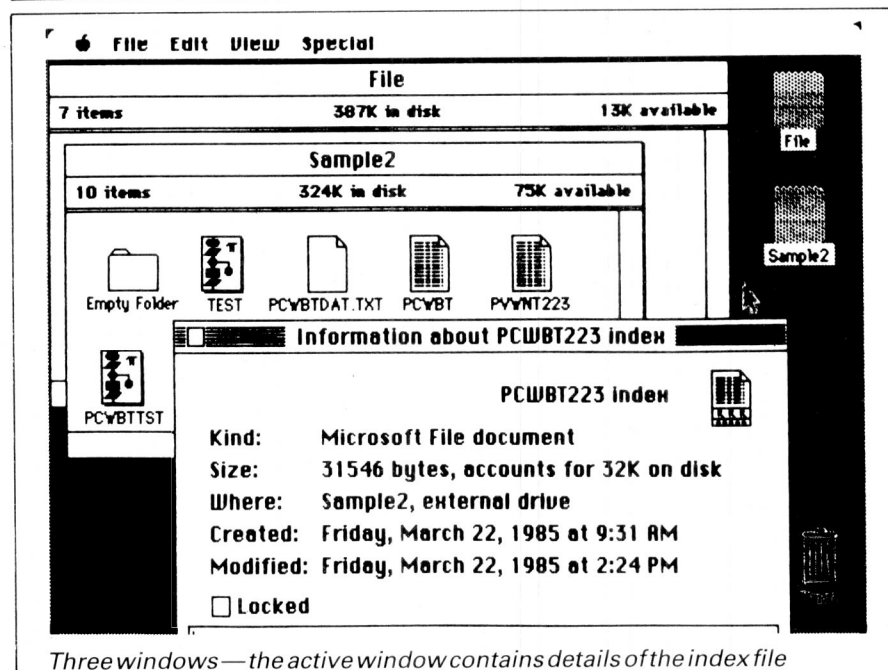
BM1	Time to add one new record	Inst
BM2	Time to select record by primary key	4secs
BM3	Time to select record by secondary key	4secs
BM4	Time to access 20 records from 1000 sequentially on three-character field (same field as in BM2 key)	1min
BM5	Time to access record using wild code	30secs
BM6	Time to index 1000 records on three-character field	2mins
BM7	Time to sort 1000 records on five-character field	2mins 10secs
BM8	Time to calculate on one-field per record and store result in record	NP
BM9	Time to total three fields over 1000 records	2mins 45secs
BM10	Time to add one new field to each of 1000 records	Modify form
Time to import a file of 1000 records: 16mins 15secs		
Notes: NT=Not tested NP=Not Possible +=including scrolling		
Where two times are given, first is access to first record, second is access to each subsequent record		

*Benchmark times recorded on a Macintosh/F*

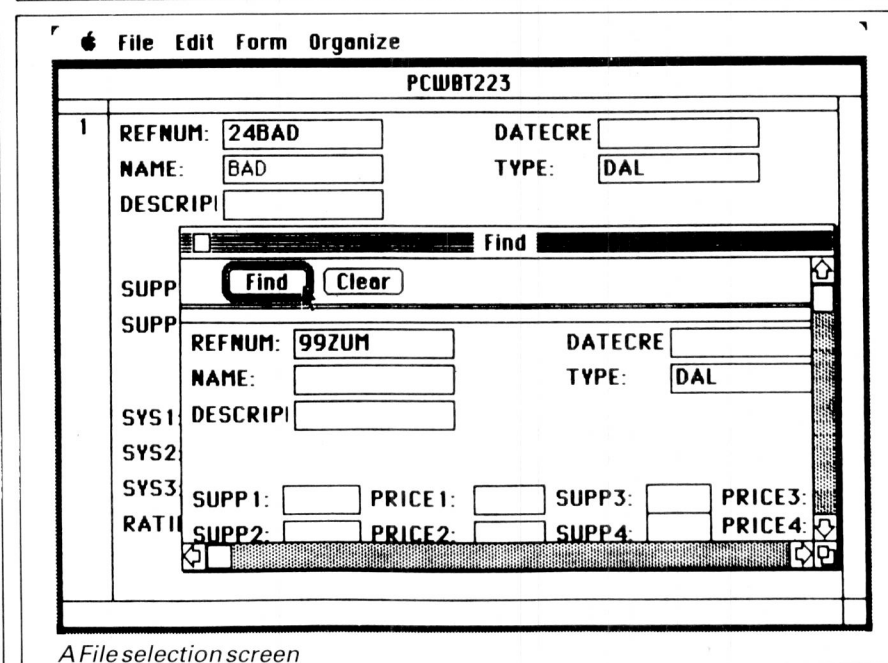




A Typical File help screen



Three windows—the active window contains details of the index file



A File selection screen

## User image

File exploits the Mac facilities quite thoroughly, and I've tried to describe how this is done while discussing the functions of the package. In some respects, though, this exploitation is patchy. When setting up and manipulating screen and report formats, the 'painting' features are excellent and imaginatively used: I spent hours playing with my forms and reports to get them 'just right', and thoroughly enjoyed doing so.

However, in most real applications, people spend far more time using forms than they do in designing them. When using the forms, there are fewer facilities and they tend to be more pedestrian. For example, scrolling through a set of records is an extremely common task. Doing this in List mode is quick and easy — you just use the mouse to move the scrolling arrows in the desired direction.

But in many applications, List would be used much less than Form because of the need to display a fair amount of information. In Form view, scrolling just moves around within the display of the one record. To move from one selected record to the next, the best way I could find was to select (with the mouse) the last field in the record and press the TAB key (which, within a record, advances the cursor one field), which seemed by comparison a rather clumsy operation. The difficulties I had with finding quick ways to add extra records reflect, I suspect, another aspect of the same problem — that features such as the laying out of forms and reports are more fun to design than the bread-and-butter basic record-handling features.

That said, the overall feel of the package will, I think, be attractive to people who like using icons and a mouse. But it is a mistake to think, as many do, that such an interface can do away with the need to consider your design before you start. Particularly when designing form and report layouts, I found a quite considerable learning curve to be involved — once I appreciated the principles, I became much faster and more accurate in my work.

In some respects, the Mac — and File — approach doesn't help as much as it might. For example, there is never any indication of how wide a field is (height is indicated by a ruler in the left margin, but width is ignored). Partly for this reason, and partly because of its physical nature, I found it quite hard to use the mouse as a precision tool for siting fields. (One of the advantages of the mouse in design work such as CAD is that it allows continuous movements, rather than the discrete movements to which cursor arrow keys are limited. But in form design work, much of the movement must be discrete.)

The lack of a gearing capability when using the mouse is also a serious





## SCREENTEST

drawback to someone working in a limited space — the Mac may have a small footprint, but Mac plus mouse certainly do not! These criticisms must, of course, be balanced against the superiority of the 'draw' approach for most aspects of manipulating elements of forms.

As to the use of pull-down menus, I found the comparison with the approach of the Perfect II suite, which I reviewed last month using an IBM PC, fascinating. For my personal tastes, pull-down menus are extremely useful, but there is little to choose between the mouse and the use of cursor keys in selecting menu items. Since in File

there are many occasions when you must use the mouse (and even where you can substitute a command sequence, you cannot see the menu without moving the mouse, whereas in most systems like Perfect you can display the menu and then use a single character key to activate an option), the advan-

tages of the mouse for issuing commands have to be highly arguable for an experienced user. This is especially true where much of the work involves entering data through the keyboard, so that using the mouse involves taking your right hand well away from the main area of action. As far as data management applications are concerned, thus far I regard the case for the mouse to be Non Proven!

### Documentation

File comes with a single manual in three main sections: Learning, Using File, and Reference. The manual is typeset, and bound in a spiral inner with card outer. There are plentiful illustrations of real screens, and the outer part of each page contains captions in heavy type giving clues about the material being described. The bulk of the material is in the Using section; the Reference section is not a comprehensive coverage of all the facilities, but a summary of each option with cross-references to the Using section. This concentrates heavily on the design features, and on using File through the List view of the data. As a result there were several functions that I just couldn't run to earth in the manual, and had to discover by much trial and error.

That said, the material which is provided is clear and well-written, although still not as well laid out as the main Macintosh manual, which I regard as a model of clarity and ease-of-use for browsers. (The index is better than File's, too — but at least the File manual does have an index!).

The approach in the Using section is to explain each feature in turn, and then to give a set of instructions on how to do the task with some example information. This 'Now do this' material is printed in much fainter type than the rest of the manual to visually indicate that it is optional material. This idea is better in conception than in execution — I found the fainter print very hard to read.

### Conclusion

File, viewed as a data management system in competition with others in its price bracket rather than just as a Mac vehicle, provides a good range of basic features. These include quite adequate sorting, reporting and screen retrieval facilities, with excellent forms design. No letter-writer is included — for that you would need to use Word — nor are there any batch processing facilities, multi-file links or programming features. Data can be easily exchanged with the other products in the Microsoft family — Word, MultiPlan and Chart — to provide as great a degree of integration as most people will need, without imposing the penalties which closer integration usually incurs. **END**

Package	Cost (£)	Summary
DMS+	195	Stripped-down version of Delta from same supplier — one file open at a time, no tailoring. Good letter-writer. Usable manuals, but no road map of menus. Separate set-up and execute (for example, in selection) tedious. Good value for money at this price.
File	190 (excl VAT)	Data management system designed to make good use of special Mac features, so very visual approach. Provides good basic data management features for single-file, fixed-format records, stored as variable length. Links to Word, Chart and MultiPlan.
Files & Folders	£295	Good value, easy-to-use package, with basic linked-file facilities (three open, eight linked). Good use of screen when setting up files. Good list and sort features; no letter-writer. Menu-driven, no tailoring or batch processing. Usable manuals, no road map.
Friday!	195	Simple, cheap, good-value package for single-file, fixed-format records. Drawbacks are clumsy approach in letter-writer and designing screen formats. Excellent tutorial manual and menu charts; reference manual is good used from screen manual.
Pearl	195	Economical storage of varying length records, multiple indexes allowed and kept up-to-date, paint-a-screen formatting for screens and reports (but no letter-writer). Entry screens can write to several files at once. Good manuals. Excellent value.
Perfect Filer II	149.95	An easy-to-use package for handling text information such as names and addresses, with good report and label formatting. Lack of calculations, and need to have editor or WP to construct formats, are serious drawbacks. WP and spreadsheet in same family

*Comparison of similar data management packages*

### Summary

Supplier	Microsoft
Telephone	(07535) 59951
Cost	£190 (excl VAT)
System	Macintosh
Version reviewed	1.0
Type	N,S
Features	Single-file, fixed-format data management system using variable length records. Provides indexed retrieval, sorting, reporting and good form design features. Extra large fields permitted, but sorting limited to 5000 records on 128k system
Drawbacks	No letter-writer, no batch processing, no tailoring to provide fast access to frequently-used features
Ease of use	Mainly very good, making sensible use of the Mac's icons and mouse. Better in design phases than in execution



# THE ONLY £100 WORTH BROADCASTING.



Our range provides a professional choice for cable tv.  
HIGH TECHNOLOGY ELECTRONICS LTD., 303/305 PORTSWOOD ROAD,  
SOUTHAMPTON, SO2 1LD. TEL: (0703) 581555 TELEX: 477465 HTEL G.

## PC SOFTWARE: OVER 40% DISCOUNT!

*Just look at some of our prices!*

FRAMEWORK	320	RRP 550	-41%!
SIDEKICK	53	RRP 89	-41%!
DBASE III	331	RRP 550	-39%!
DBASE II	239	RRP 395	-39%!
WORDSTAR	195	RRP 295	-34%!
PAINTBRUSH	95	RRP 139	-32%!
CIS COBOL	302	RRP 425	-29%!
LOTUS 1-2-3	304	RRP 430	-29%!
OPEN ACCESS	322	RRP 449	-28%!
SYMPHONY	413	RRP 550	-25%!

*Most popular business micros supported!  
Similar discounts for accessories & add-ons!  
(IBM-PC prices shown excluding VAT)*

Call us NOW on 0480 53044 for further details!

### Elite Computer Systems

40 SAPLEY ROAD · HARTFORD · HUNTINGDON · CAMBS PE18 7YG



## SEE WHAT YOU'RE MISSING FROM AUSTRALIA



### Highly Adaptable Acoustic Couplers

The Sendata 700 series of acoustic couplers is already proving popular in the UK.

The 600/1200 BPS half duplex coupler has unique circuit design which offers excellent reliability when operating over the normal telephone network. The system is ideal for the analysis of software/hardware at remote locations.

The 75-600/1200 BPS coupler offers a full duplex system with different transmit and receive speeds. Its greatest benefit is for transmitting keyboard data and receiving volumes of information at high speed.

The 600/1200 - 75 BPS coupler enables order entry and stock control information to be sent at high

speed with the assurance of accurate data transmission by using the low speed channel to transfer the ACK/NAK control sequences.

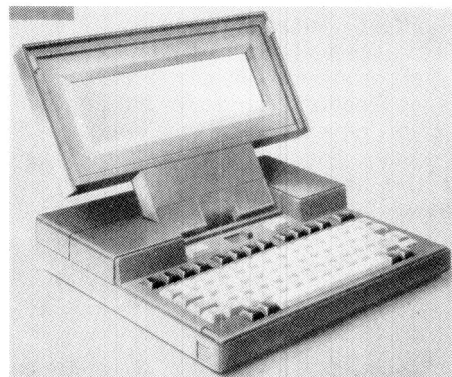
UK Agent: Bencom Sendata, Drayton House, Gordon Street, London WC1. 01-387 7792.

UK Office: 101/110 1st Floor, 35 Piccadilly, London, W1. 01-439 8985

### Powerful Portable Computer

Features of the Kookaburra portable computer from Time Office Computers include 6MHz 80 186 processor, 96k memory (expandable to 256k) with an additional 128k of internal ROM and a 16 line LCD screen and professional quality QUERTY keyboard.

Yet the equipment weighs less than 4kg and measures only 305mm x 280mm x 51mm. Rechargeable batteries give up to 8 hours continuous operation, or mains power may be used.



These Australian made products have strong potential for good sales for the agent and as efficient, reliable products for the end user in the UK market. They demonstrate the specialised skills and expertise of Australian manufacturers whose products have proved their worth by their performance internationally.



For further information

### ASK THE AUSTRALIAN TRADE COMMISSIONER

Australian High Commission,  
Australia House,  
Strand, London WC2B 4LA.  
Tel.: (01) 438 8000

Australian Consulate-General,  
Chatsworth House, Lever St.,  
Manchester M1 2DL.  
Tel.: (061) 236 9815





SCREENTEST

# PC Automator

*Peter Bright looks at Direct Technology's PC Automator, a utility-cum-programming language which allows you to customise standard applications packages.*

How many times have you sat in front of your favourite applications program and thought: 'Why does it need that stupid control sequence?' or 'How does this work?'

The problem with most applications programs is that there is no way of tailoring the way they work — you're stuck with what you are given.

A new product, called PC Automator from London-based Direct Technology, goes at least some of the way towards allowing you to customise standard applications programs like WordStar or Lotus 1-2-3. PC Automator runs on the IBM PC and close compatibles.

The technical term for PC Automator's ability to sit in the memory of the PC and run at the same time as another program is 'co-residency'. In effect, Automator steals RAM and processor time from the applications program, and sits between you and the applications program filtering what you type and what the program displays. The overall PC Automator system is made up of three separate modules — Learn, Remember and Do.

Learn is a mini program generator, Remember is an intermediate code compiler, and Do is a co-resident intermediate code interpreter.

To program PC Automator, you first use Learn to generate a sequence of ACL (Automator Command Language) commands. Remember then compiles these commands into an intermediate code file which can be understood by Do, which in turn executes your commands. This may sound complicated, but is, in fact, extremely straightforward.

## Learn

Learn is probably the flashiest part of the Automator system.

You load it into the system in the usual way by typing Learn at the system prompt. Once it is loaded, Learn sits quietly in a corner of memory noting what you are doing.

Due to Learn being co-resident, to all intents and purposes the system looks like it is empty, and you can load and run applications programs in the normal way. The only way to determine that

Learn is in the system is that the cursor changes from underline to block mode.

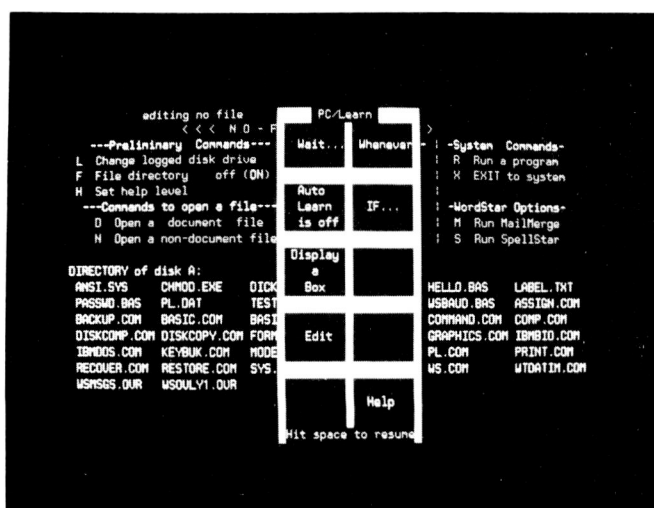
It is perfectly possible to have multiple copies of Learn sitting in memory at the same time. This can be useful for teaching the system how to use Learn.

To control Learn, you can toggle a menu display on and off by using the SCROLL LOCK and space bar keys on the keyboard. The menu is displayed on top of whatever you may have on the screen at the time, and commands are issued via the function key pad.

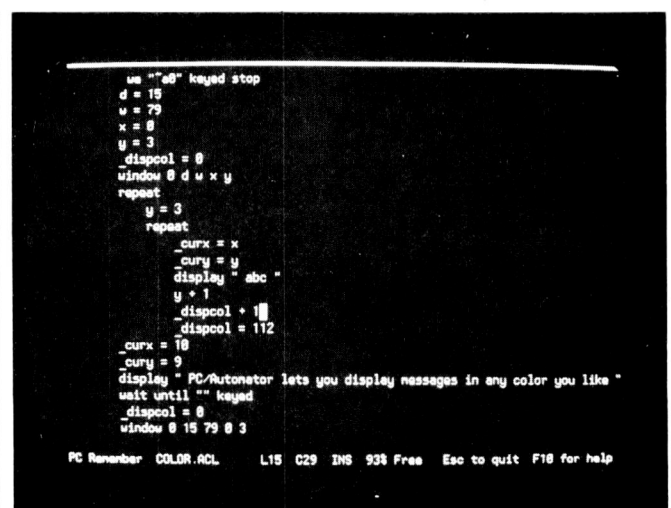
When Learn is first loaded, the commands available are WAIT, WHENEVER, AUTO LEARN, IF, DISPLAY A BOX, EDIT and HELP.

Probably the most-used function is AUTO LEARN. This makes a note of everything you key in and stores the sequence as Automator commands. You can toggle the Learn function on and off by pressing the f3 function key.

The Automator system makes heavy use of windows to define areas where data is to be read and written. You can have up to 19 input windows and one display window per system.



A display of the Learn menu functions



Remember mode allows use of Advanced ACL features



Learn makes it very easy for you to manipulate windows. Using the cursor keys you can shrink, expand and move windows to your heart's content until they are the right size in the right place.

Most of the Learn functions make use of windows. WAIT allows you to define up to six windows and wait for a specified event to occur in the window before proceeding. It can also wait for a certain amount of time or until particular keys are pressed.

WHENEVER allows you to specify an action to be taken when a particular event occurs. For example, I often type 'DIT' when I mean 'DIR', so I could set up a WHENEVER command saying 'Whenever I type DIT, replace it with DIR automatically'. This command is very useful, especially for handling any errors which may occur.

IF allows you to perform the IF..THEN..ELSE..ENDIF operations so beloved by Basic programmers. When you hit the IF function key, you can define up to eight windows in which to declare the text you want to match. You can then specify the operations you want Automator to perform if the IF statement is true, or for the Else part of the operation. When you have finished the definitions, you hit the ENDIF key which finishes the operation.

The final building block for the Learn section is DISPLAY A BOX; this opens a window to display a message of your choice to help the user. As you create a system, Learn will turn your actions into a text file of Automator commands which can be edited using the edit function from the menu box.

## Remember

The second segment of the Automator system is Remember, and is the only one of the three Automator segments which isn't co-resident. When you are running Remember, you can't have any other applications programs running at the same time.

Remember takes a text file containing Automator commands and compiles the commands into a form understood by the Do interpreter.

The text file containing the Automator commands can come from one of two sources. In most cases, it will have been generated by the Learn module. However, more advanced users can write their own programs from scratch using the editor provided with the Remember module.

Although it isn't as straightforward as using Learn, writing your own programs does allow you to use some of the more advanced features of the Automator Command Language (ACL) which are not available from Learn.

The syntax of ACL is similar in many ways to that of Basic. Although it is quite a simple command language, ACL does have a reasonable set of control structures including IF .. THEN .. ELSE .. ENDIF, REPEAT UNTIL and WHENEVER .. ENDWHEN. As ACL doesn't use line

numbers, branching is done to labels. You can either branch to subroutines (CALL and EXIT) or you can GO (to) a label.

Windows are specified by using the WINDOWS command followed by values for window number, depth, width, and the column and row positions. When I was writing ACL programs, I found it easier to use Learn to define all the window positions rather than try to work them out by hand.

Many of Automator's features are geared to allow you to alter what is displayed on the screen of your PC, or to simulate keyboard entries in order to fool an applications program.

The DISPLAY command allows you to display strings on the screen. Using a combination of this and program control structures, you can build powerful programs which allow you to intercept the output from an applications program and replace it with your own. A good example would be if you didn't like a program's help description, you could trap the output and substitute your own.

The TYPE command inserts character strings directly into the keyboard buffer. As most applications programs read keyboard input from the buffer, you can fool it into thinking that you have typed in something when, in fact, it has been output from Automator. This single command can do as much as, if not more than, most Smartkey-type utility programs I have seen.

When you couple the DISPLAY and TYPE commands with the control structures available, you have an unprecedented level of control over your applications programs. For example, you could quite easily customise WordStar or Lotus 1-2-3 out of all recognition simply by interrupting the keyboard input and display, and making up your own Automator alternatives. The limitations tend to come from your lack of imagination, rather than from Automator itself.

Automator supports three kinds of variables — numeric, string and system. Although these are useful, for the most part they are limited in scope because of the lack of manipulation facilities built into the programming language. The exceptions are the system variables which allow you to gain information from the system.

The system variables -DAY, -MONTH, -SECS, -TIME and -YEAR allow you to access the system clock from within Automator. In addition, -CURX and -CURY allow you to read or write the cursor position. For example, A = -CURX would assign the X coordinate of the cursor to the variable A, while -CURX = 18 would move the cursor to X coordinate 18. This is helpful when you are playing with windows.

-DELAY allows you to specify how fast Automator enters data into the keyboard buffer when you use the TYPE command, which is very useful be-

cause some packages such as WordStar can only accept fairly slow keyboard input. DELAY gets around this by allowing you to output characters from Automator at a rate which is acceptable to the applications program.

Using -DISPCOL you can control the colour and brightness of the display from your program. Depending on the value from 1 to 255, you can set the foreground and background colours as well as underlining, flashing, and so on.

The final system variables are -ERROR, -STACK and -TIMEOUT. -ERROR and -TIMEOUT are used in conjunction with the WAIT command in the programming language. The value of -TIMEOUT governs how long the WAIT command will wait for something to happen before it gives up in disgust and generates an error. -ERROR allows you to trap unfulfilled wait errors, and, finally, -STACK allows you to play with the contents of the system stack.

## The Do module

When you have written and successfully compiled your Automator program, you can run it by passing the compiled intermediate code file to Do.

Like the Learn module, Do is co-resident with whatever application program you are using. You can always tell that Do is in the system because the cursor rises and falls as if it's breathing. To run your program, type Do followed by the filename of your program: for example, DoNothing.

## Conclusion

Automator is one of the most useful pieces of IBM software I've come across in a long time. When I first saw the product, I thought it would be much like the SmartKey-type products which do little more than assign strings of characters to keys on the keyboard. Fortunately, this is not the case.

One of my major problems when reviewing Automator was that I stopped treating it as a utility and started to use it as a full-blown programming language to do things it was never designed for. It says a lot about the facilities provided that this was possible, and as long as you stay within the limitations you can do a great deal.

Beginners, especially, can produce useful applications using the Learn applications generator, while more adventurous types can dive straight into the program code.

The only time you might run into a problem is if you have a number of co-resident programs in the system as well as Automator. Desk accessory programs such as Spotlight, Sidekick, and so on, could compete for the same system resources as Automator, which could have some very strange effects.

Overall, I liked Automator a great deal. It allows you to do more than just assign strings to keys, and it works in a simple and straightforward way. **END**



# Proceed with Logo

*Harvey Mellor stresses the importance of variables, procedures and recursion in his introduction to this Teach Yourself Logo series.*

Logo is becoming well known as a programming language in schools, but its success in this field has led to it being dismissed in some quarters as 'just turtle graphics' or 'just for kids'. This is a highly inaccurate view of a fascinating language, for while it is true that Logo is an ideal introductory language, it is also a powerful high-level language which is particularly suited to processing symbols rather than numbers.

Logo certainly began as an educational language, as did Basic. But whereas Basic came out of the Fortran-based scientific tradition and was designed to deal mainly with numbers, Logo comes from the Lisp artificial intelligence (AI) tradition and was designed to deal with more general symbols. The people involved with the early development of Logo in the late Sixties were also closely involved with AI research. They believed that AI had something to say about learning, and that Lisp-like languages were necessary if people were to write 'intelligent' programs. These languages were intended to be closer to the way in which people think than the more machine-oriented, high-level languages such as Fortran and Basic.

Imagine this scenario: an MIT (Massachusetts Institute of Technology) professor comes home after a hard day hacking at Lisp code in the AI lab, and meets his kids back from school. 'Hey Dad, we've been learning Fortran programming in our maths classes.' The MIT professor sees red, and begins to design a new language. Now this story has no historical truth, but I believe it does capture one of the ingredients that went into Logo's origins.

Logo was initially implemented on mainframes (there were only mainframes at that time). It was used in a variety of projects during the Seventies, mainly at MIT in the US and Edinburgh University here. The projects involved such things as teaching programming to young children, learning mathematics in secondary school, exploring mathematical modelling for physics and maths undergraduates, and teaching AI at undergraduate level.

A Basic interpreter could be fitted into a few kbytes of ROM, but a Logo interpreter needed around 30k as well as a fair amount of room to run in. While

Basic had been easily implemented on micros, it was only with the appearance of larger memories that Logo on micros became feasible. 1980 saw the first microcomputer versions, and a language that had previously been restricted to a few universities and research labs suddenly became widely available.

Today, most micros have at least one full version of Logo. A number of Logo dialects now exist, the three most widespread being MIT Logo (the original), LCS Logo (LCSI is a company set up by ex-MIT people including Logo's founder, Seymour Papert) and Edinburgh Logo, the home-grown (but less popular) variety.

## The turtle

Start up a Logo system and you'll be presented with a 'turtle' in the middle of the screen; this is usually a triangular shape, although this varies — on the Atari it is actually a turtle shape. The turtle is an 'object' with which we can communicate. You can give it simple commands to move across the screen — FORWARD 50, or to turn — RIGHT 90. The turtle carries a pen and it draws a line as it moves. You can tell the turtle to lift up the pen so that it does not draw on the screen (PENUP) or put it down again (PENDOWN). With these simple commands we can draw shapes onscreen.

If you make a mistake, such as misspelling a command, Logo will complain. The error messages are clear and to the point. Logo takes error-reporting very seriously: it is not an afterthought, but an important part of the whole system. The turtle was originally a robot that responded to the drawing commands. We've seen how to give the turtle simple commands, but communication should be two-way. The turtle can provide information about itself: where it is on the screen, whether the pen is up or down, and so on. Try the PRINT HEADING command — Logo prints out the direction in which the turtle is facing (measured in degrees, with 0 considered as straight up the screen). It is this metaphor of the turtle as a communicating object that lies at the heart of Logo's success as an introductory programming language.

If you practice drawing a few shapes with the commands I have mentioned

so far, you will quickly meet the need for a method of repeating a sequence of commands. For example, repeating four times the commands FORWARD 40 RIGHT 90 will produce a square. In Logo, you could shorten this by writing REPEAT 4 [FORWARD 40 RT 90]. The number after REPEAT is the number of times you want the commands obeyed. The commands themselves are written out within square brackets, which are used in Logo to mark out a 'list'. A list is just an ordered collection of symbols: that is, words, commands and numbers (or even other lists).

## Procedures

The commands I have presented so far are referred to as 'primitives'; they are part of Logo itself and are understood by the system as soon as it is loaded. Logo can also be taught new commands or procedures. You can define a procedure called 'square' by writing

```
TO SQUARE
  REPEAT 4 [FORWARD 40 RT 90]
END
```

You type this into a full-screen editor that is part of the Logo system. These editors vary slightly from machine to machine, so you will have to consult the manual as to how to use it.

We can now type SQUARE as a command, use SQUARE with other commands (for example, REPEAT 12 [SQUARE RT 30]), or even use it as a sub-procedure in the definition of other procedures:

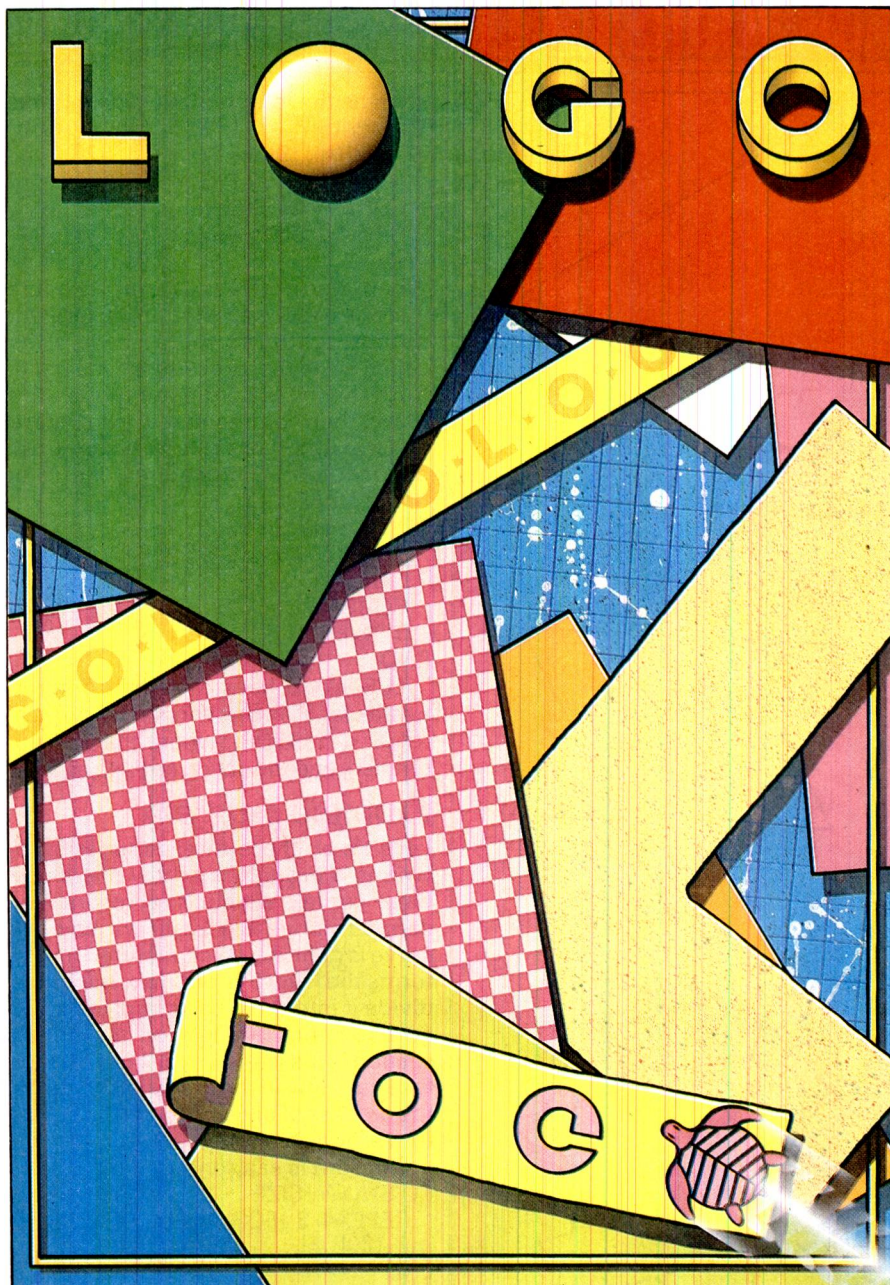
```
TO TOWER
  REPEAT 4 [SQUARE FORWARD 40]
END
```

Logo treats these procedures exactly as if they were primitives (except that they will be forgotten when you switch off). The basic idea of programming in Logo is therefore one of extending the language by defining new procedures until it can deal with your problem. Forth and Lisp also have this type of 'extensibility'.

Some of the advantages of extensible languages include hiding nasty details within sensibly-named procedures, creating special environments for others to use (for example, for children's programming), and developing your programs in a top-down fashion.

Logo is an interpreted language (like Basic) so you can enter anything you





like into a procedure definition. When you ask Logo to obey that procedure it goes word by word through the procedure, obeying the primitive commands as it comes to them, or looking up the definitions of any sub-procedures and then running them. Only if a procedure is not present at the time when Logo wishes to run it will it complain: you can write your top-level procedures using lower-level procedures that you have not yet written.

While top-down design of programs is a good thing, you may be glad to learn that Logo is also open to other methods of use. The most interesting programs are not written top-down, or bottom-up for that matter, but rather 'middle-out' (that is, by writing a program to solve an interesting bit of the problem and then expanding, adding and refining). Most Logo programs are written that way.

## Variables

The procedure SQUARE always draws a square of side 40 units. In this sense,

SQUARE is rather like a primitive such as PENUP which only has one possible effect. Some other commands, such as FORWARD, are followed by a number which acts as an 'input' and determines the exact action to be taken. We can write a SQUARE-drawing procedure which requires an input in this way:

```
TO SQUARE: SIZE
  REPEAT 4 [FORWARD: SIZE RT 90]
END
```

To call this procedure we now type SQUARE 30 or SQUARE 60 in order to get squares of side 30 or 60 respectively. SIZE is called a 'variable' and it works in this way: whenever the procedure is called, Logo stores away the number following SQUARE in a 'box' and sticks the label SIZE onto it. Then, later, when Logo sees :SIZE, it finds the right box and replaces :SIZE by the value it finds there.

The variable used here is said to be 'local' to the procedure call: that is, as soon as the procedure has finished running, Logo forgets that it ever had a

variable called SIZE. This way of using variables is very similar to the formal parameters in a Pascal procedure definition, but is rather unlike the way variables are used in Basic.

The reason for the colons (read them as dots) will be fully explained next month. For the time being, you can take it that a word with : in front of it must be the name of a variable. No : means that the word is the name of a primitive or of a procedure.

## Recursion

```
TO DAILY.GRIND
  WORK
  SLEEP
  DAILY.GRIND
END
```

Here we have defined a procedure in terms of itself. This is called 'recursion' and is widely believed to be a highly mysterious process. Not so! Look at this definition of a square:

```
TO SQUARE: SIZE
  FORWARD: SIZE
  RIGHT 90
  SQUARE: SIZE
END
```

When you type SQUARE 40, Logo looks up SQUARE in its list of known words, and the turtle goes forward 40 units and turns right 90 degrees. Logo then sees that it must now do SQUARE 40, so it looks up SQUARE and the turtle goes forward 40, turns right 90, at which point . . . The procedure will run forever, so after it has drawn the square and is retracing its steps, you stop the turtle (CTRL-G stops Logo in almost all versions).

That's a fairly unusual way of drawing a square, but what about the 'square spiral' shown in Fig 1? Think about drawing this starting from the inside. The turtle must first do FORWARD 5 RIGHT 90, and then carry on with the rest of the spiral. But the rest of the spiral is almost the same as the whole spiral, if you see my point. I'm suggesting that this shape — a spiral beginning with length 5 — is made up of two parts, FORWARD 5 RIGHT 90, followed by a spiral beginning with length 10. So, in Logo:

```
TO SPIRAL: SIZE
  FORWARD: SIZE
```

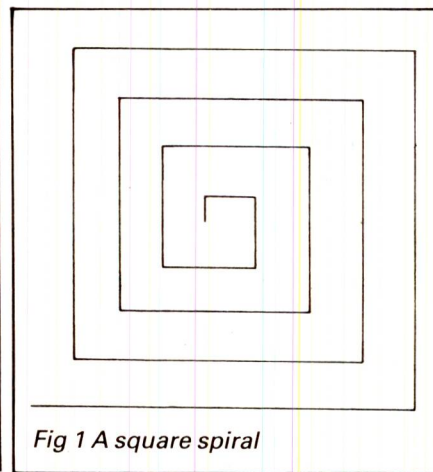


Fig 1 A square spiral



# TEACH YOURSELF LOGO

RIGHT 90  
SPIRAL :SIZE + 5  
END

In this case, it is natural to describe the shape in terms of recursion; any other description would be rather artificial.

In attempting to understand how this procedure works, bear in mind that each time SPIRAL is called, a new variable called SIZE is created. Each value of SIZE is known only to that particular procedure call. Think of each procedure call as producing a copy of the original procedure, complete with its own library of local variables.

The alternative to recursion is to use 'iteration', which is the name given to repeating chunks of code using WHILE/WEND, REPEAT/UNTIL and FOR/NEXT loops, or even GOTOs. In Logo, REPEAT is used for very simple situations, but otherwise recursion is usually used in preference to iteration.

Two objections are often raised to the use of recursion: firstly, that it is difficult; and secondly, that it uses a lot of computer memory. The reason many people find recursion difficult may simply be unfamiliarity. Some computer languages (most versions of Basic, Fortran and Cobol) do not have recursion, and even languages that do (Pascal) never really encourage its use. There are, however, a great many problems in computing that are most easily, and most naturally, expressed using recursion.

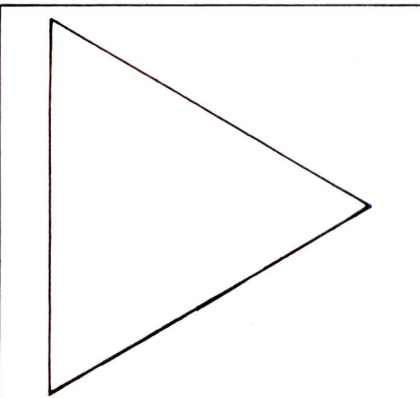
The problem over use of memory is a real one. Most versions of Logo alleviate this problem somewhat by efficiently implementing so-called 'end recursion' — that is, procedures in which the recursive call is in the last line. In this situation, recursion does not use any extra memory as it runs. It is often worth recasting procedures into an end recursive form if it is possible to do so.

The only way to get used to recursion is to use it. Turtle graphics is an ideal area in which to learn to think recursively. You may find it strange at first, but it won't be long before it is iteration that begins to seem slightly difficult.

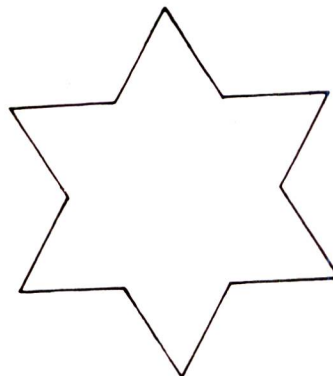
Recursive procedures that carry on running until they are stopped by typing CTRL-G are of limited usefulness. A couple of recursive procedures from real life illustrate the solution to the problem of stopping:

```
TO ADJUST.SOUND
  IF LOUD.ENOUGH THEN STOP
  TURN.CONTROL
  ADJUST.SOUND
END
TO DRINK
  IF UNCONSCIOUS THEN FALL.OVER
  STOP
  SWALLOW.BEER
  DRINK
END
```

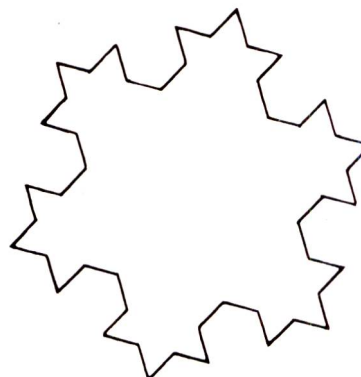
These are examples of 'stop rules' which are implemented using the



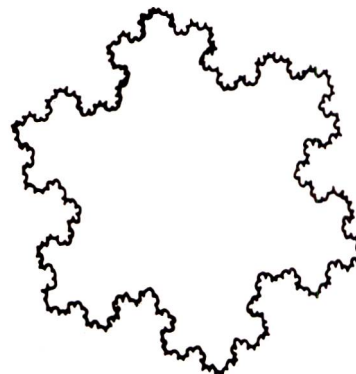
Level 1



Level 2



Level 3



Level 4

Fig 2 The gradual development of the snowflake curve

familiar IF/THEN structure.

You can do exactly the same thing in Logo, so to stop the spiral program as

soon as the length of the side exceeds 100, write:

```
TO SPIRAL :SIZE
  IF :SIZE > 100 THEN STOP
  FORWARD :SIZE
  SPIRAL :SIZE + 5
END
```

When Logo meets STOP in a procedure, it stops executing that procedure and returns control to the procedure that called it. If the procedure was called from the initial command mode ('top-level') then command returns to there.

Here is another example which draws a series of shrinking squares, one on top of the other:

```
TO TOWER :SIZE
  IF :SIZE < 5 THEN STOP
  SQUARE :SIZE
  FORWARD :SIZE
  TOWER :SIZE - 5
END
```

LCSI Logo uses a slightly different syntax for IF. In this version you write IF :SIZE < 5 [STOP], where the THEN is omitted, and the action is given as a list.

## Example program

Let's tie all these threads together by writing a program to draw the 'snowflake curve', which is a recursively-defined curve. Fig 2 shows how the curve is defined: an equilateral triangle forms the level 0 curve. Take each side, divide it into three parts, and construct an equilateral triangle on the middle section. This is the Level 1 curve. Now take each line in the drawing and repeat the process of division to get the Level 2 curve, and so on.

The start is easy enough:

```
TO SNOW :SIZE
  REPEAT 3 [FORWARD :SIZE RIGHT 120]
```

END

draws the level 0 curve, but you now need to replace the straight side (FORWARD :SIZE) with a more complex shape which is dependent on the level. You will need two inputs, one for the size and one for the level. Your second attempt therefore is:

```
TO SNOW :SIZE :LEVEL
  REPEAT 3 [SIDE :SIZE :LEVEL RIGHT 120]
```

END

As to drawing the side, if it is level 0 then it is simply a straight line. Otherwise it is made up of four sections, each of one lower level.

```
TO SIDE :SIZE :LEVEL
  IF :LEVEL = 0 THEN FORWARD :SIZE STOP
  SIDE (:SIZE / 3) (:LEVEL - 1)
  LEFT 60
  SIDE (:SIZE / 3) (:LEVEL - 1)
  RIGHT 120
  SIDE (:SIZE / 3) (:LEVEL - 1)
  LEFT 60
  SIDE (:SIZE / 3) (:LEVEL - 1)
```

END

This is part one of a six-part series. **END**



# Just because you bought an IBM\* computer, you don't have to miss out on the JUKI 6100.

It did seem a trifle unfair, after all. Because the JUKI 6100 quickly became one of the best-selling letter quality daisywheel printers in the UK.

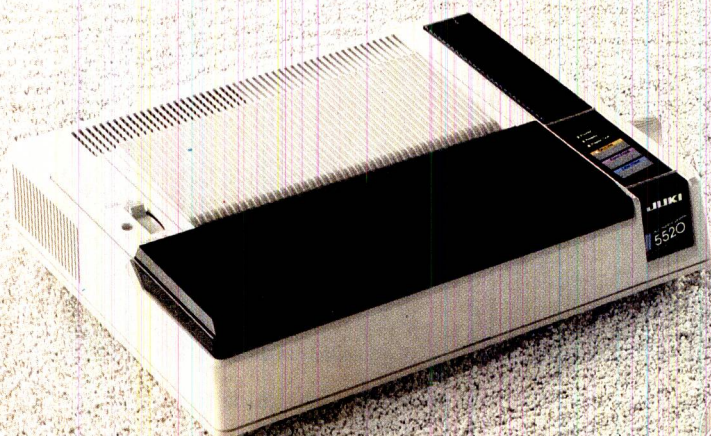
So now we've introduced the brand-new JUKI 6100-I, which, as the suffix suggests, is IBM\* graphic printer compatible. It has all the features of the original 6100, including graphic mode and full word processing support, yet it costs just £379 plus VAT. Another new release is the highly successful JUKI 6000. There aren't many letter quality daisywheel printers designed specifically for use at home.

The high speed JUKI 5520 dot matrix printer is a stunning example of high quality advanced technology at a remarkably low price. Complete with graphic mode, it's ideal for your personal computer, and even has an optional 4-colour print function.

See them all for yourself at your local JUKI dealer.

They may not have been out for long, but they'll be around for a good deal longer.

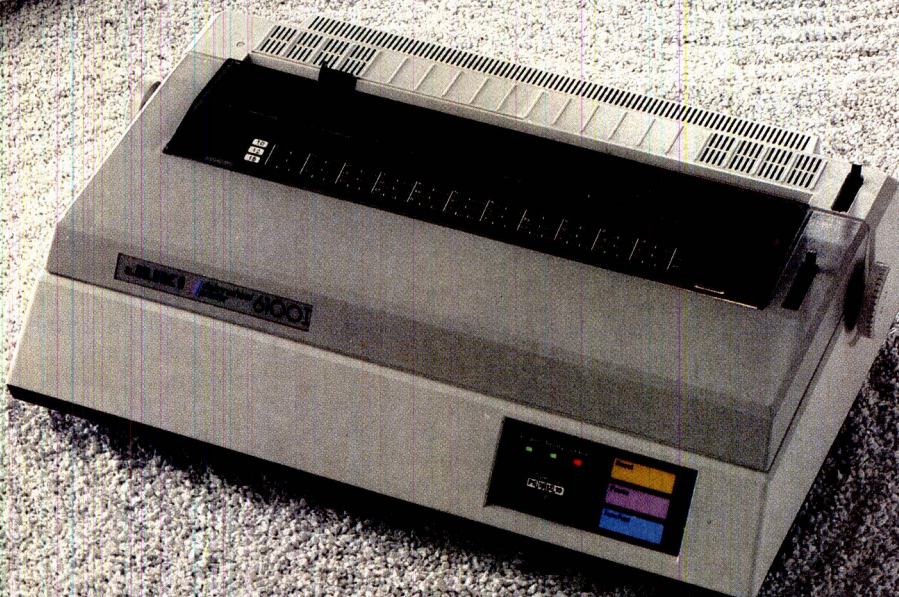
\*IBM is a trade-mark of IBM Corporation.



JUKI 5520



JUKI 6000



JUKI 6100-I

# JUKI

Technology true to type

JUKI (EUROPE) GMBH · Eiffestr. 74 · 2000 Hamburg 26 · F.R.Germany

Tel.: (040) 251 20 71-73 · Telex: 2163 061 (JUKI) · Fax: (040) 251 27 24

Sole distributor:



Intec Unit 3, Hassocks Wood, Wade Road, Basingstoke, Hants, RG 24 0NE

Tel.: (0256) 47 3282 (32 lines) · Telex: 8 59669 MICRO-PC · Facsimile (0256) 46 1570





*Living computers stalk the Silicon Valley spys in this months selection of books. David Taylor dips into the realms of disbelief.*



## Alive, alive-o

**Title:** The Biology of Computer Life—  
Survival, Emotion and Free Will  
**Author:** Geoff Simons  
**Publisher:** Harvester Press  
**Price:** £15.95

Fundamental questions are raised by this peculiar book including the question of whether computers are capable of appreciating any sort of morality. The question of whether computers will evolve sexual feelings, and the question of whether Geoff Simons, author of a previous thought-provoking tome *Are Computers Alive?*, is more or less off his chump.

I mean you do wonder. Mr Simons, chief editor at Manchester's National Computing Centre, is one who believes

vehemently that computers are fast becoming a new type of living creature. Notwithstanding that he's well aware of all the fuzzily philosophical and semantic ifs and buts surrounding such a concept — What does living mean? What defines thought? — Mr Simons is himself such a live wire that he too easily gives the impression that computers are about to take over the Earth's unsteady reins *any minute*.

I was reminded, as I reeled through this book's ever more bizarre and fanciful predictions, of a day the BBC once persuaded me to spend in the company of Erich von Däniken. He, though superficially lucid and a best-selling author besides, tends to unsettle his audience by taking it as read that many of life's imponderables can be put down to the fact that, once upon a time-warp, Little Green Men looked in

on us. For him it stands to reason that they'll shortly be back.

Von Däniken, some might suppose, has stepped over the thin dividing line between far-seeing conjecture and the nuthouse. Whereas Geoff Simons has (to date) only got periously close to the edge. What will happen in the next half century with computers, or with anything else — even supposing there *is* a next half century — is anybody's guess. Most of us prefer to get by *pro tem* on the assumption that we'll manage for the next dozen years or so and maybe think again after that.

Mr Simons is hell-bent on thinking through everything *now*. It is his technique of combining obscure academic references with hip, James Burkeian phrasing of sensationally ooh-er predictions which I find intensely irritating, for example 'It is highly



likely that computer organisms will evolve consciousness... but we should also remember that much important human information processing is unconscious: we can recall such unconscious (or semi-conscious) accomplishments as Poincaré's identification of the transformations used to define Fuchsian functions with those of non-Euclidean geometry and Kekulé's formulation of the structure of the benzene molecule.'

Personally I could not, off hand, recall either one. It makes it hard to leap-frog alongside go-getting Geoff into believing that my PC is poised to go conscious, go unconscious, or come to that go and make a pot of tea off its own bat.

Call me a stick-in-the-mud realist, but I find life's hard enough, for the moment, getting to grips with DOS. 'We can speculate,' chunters on Mr Simons in an especially rich section on computers evolving feelings, 'on what emotion will be like in organisms able to process information at the rate of hundreds of millions of operations every second'.

We can indeed. Or we can speculate, for that matter, on whether pigs might fly. My point is that in either case, we ought perhaps to speculate yet again on where such extravagant speculation gets us. Apart, that is, from into print.

## Floppy days are here again

**Title:** Disk Basic On Your Micro  
**Authors:** Michael Chadwick & John Adrian Hannah  
**Publisher:** Sigma Press  
**Price:** £7.50

A happy hacker's starter for those moving over for the first time from cassettes to floppy storage and full of hints like don't leave disks out in the rain or write on their jackets with a biro.

You're shown how to file your friends' phone numbers or catalogue your books. You get 40-odd programs to fiddle about with — Basic tailored for BBC, VIC-20, Applesoft and MS-DOS machines — and potentially hours of fun if you're more absorbed by DIY than running off-the shelf applications. Nothing startling, but not bad for £7.50 if you've finished your homework.

## Cloak and dagger

**Title:** Espionage in the Silicon Valley  
**Author:** John D. Halamka  
**Publisher:** Sybex  
**Price:** £8.85

This is all very unsavoury stuff. In an all-American gee-whiz and pruriently chop-smacking fashion, it details a catalogue of hi-tech spy cases which have bedevilled California's Silicon Valley and given even hard-bitten FBI

agents pause for thought.

Murder, bribery and extortion infest a text which, we're assured, is factually based but isn't half hoked up to keep out wide-eyed, open-jawed attention.

We get to meet James 'Jimo' Harper, whose alcoholic lover had access to classified security files and was prepared to pass on copies to Polish intelligence in exchange for well-stuffed plain envelopes.

Out of the woodwork comes Larry Lowery, a black-market chip dealer and generally nasty piece of work now awaiting trial on charges of bumping off a heroin addict who was scheduled to testify against him in a \$3.2 million chip theft case.

And we get lots of smudgy pictures and Xeroxed letters to lend authenticity to a nauseously seedy tale — one which perhaps could have been sub-titled *Silicon Valley of the Dolls*. In a word: yerch.

## Yet more DOS

**Title:** Running MS-DOS  
**Author:** Van Wolverton  
**Publisher:** Microsoft Press/Penguin  
**Price:** £16.95

This Microsoft-with-Penguin paperback is handsomely produced, and more chattily accessible than IBM's pink ring-binderful. But as one who has hammered long and hard at the original manual anvil of PC-DOS, I wondered how much I might discover that I didn't already know. To which the answer proved to be, as Van Wolverton might put it, zilch.

Well over fifty PCs, aside from IBM's old stager, now use Microsoft's masterpiece (or a slightly tailored version of it) as their operating system. That looks like reason enough to do a primer. The only snag is, of course, that well over fifty PC makers have already done it and, in the case of the most universally known IBM version, done it comprehensively well.

So what's the point? Simplicity, modest Mr Wolverton says. His book skips the knottier passages of the senior manual and more succinctly arranges what you need to know to get applications up and running chop-chop. It assumes neither that you are, nor that you aspire to become, a programmer.

It says OK and let's go, straight into a lucid summary of the bare necessities of DOSsing down, then on into useful hints on how to get DOS to perform extra file-sorting functions or customised 'smart' commands (to make archives or give yourself personalised messages and prompts within DOS).

I found it pretty absorbing, despite the lack of surprises. Van Wolverton has an easy as well as authoritative style and makes a good job of those areas where the IBM manual is not at its best — describing EDLIN, for example, or getting together batch files.

I don't as a rule welcome manual re-writes when the original is half-way decent, but this one is sufficiently well produced and civilised in its approach to deserve a recommendation.

## Does he like computers?

**Title:** Micros For Handicapped Users  
**Author:** Peter Saunders  
**Publisher:** Helena Press  
**Price:** £5.95

There is a notorious approach, invariably well-meant but stupidly insensitive just the same, of talking down to the physically disabled as if they were all mentally handicapped too.

Hardly surprising, it is deeply frustrating for those suffering from physical misfortune, but whose wits are as sharp as anyone else's, to be treated as if they are only to be addressed via an interpreter. It is an attitude which the BBC (whose programmes for the handicapped are as a rule excellent) brilliantly parodied in a radio series called *Does he take sugar?*

In the case of the mentally handicapped, also, there is too often the public supposition that they can only ever be addressed in absurdly simplified or grotesquely cooey-coo terms — taking no account of the fact that mental handicaps vary enormously in their severity.

Perhaps for such reasons, the pleasures and benefits which the handicapped can quite obviously gain from mastering micros are widely underestimated. Scarcely any computing books address the possibilities with so much as an addendum, but this one, part of a commendable series from Yorkshire's Helena Press, does its best to combine encouragement for the idea of computing (with several very moving case histories) and hard information.

With an enormous amount of well-researched reference, it describes how the disabled can set about getting started or finding out more about what's available from specialist suppliers and agencies — like switches worked just by a blink, electropalato-graphs, Braille keyboards.

The main text is regrettably uneven (several writers are included) and, to an indefensible extent, it patronises the reader. 'What about the power supply?', we are for example asked, 'all those trailing wires and plugs and switches?'. Nevertheless this book is of course to be welcomed: the information content is high, the need for it even higher. Micro-computers can often readily provide the stimulation and fascination of which many disabled people feel in desperate need. As this book's foreword points out, it is the ability and not the disability which we should rightly concentrate on.

END





# TJ'S WORKSHOP

*Our monthly pot-pourri of hardware and software tips for the popular micros. If you have a favourite tip to pass on, send it to TJ's Workshop, PCW, 62 Oxford Street, London W1. Please keep your contributions concise. We will pay £5-£30 for any tips we publish. PCW can accept no responsibility for damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.*

## SPECTRUM EXTENDED BREAK

Are you a machine code dabbler with a Spectrum? Do you keep getting stuck in endless loops? If so the routine in listing one (or listing two if you don't have an assembler) should help. It 'extends' the function of the BREAK key so that it functions not only at the end of every Basic statement, but also every fiftieth of a second, even when executing machine code.

Z80 mode 2 interrupts are used to jump to the routine, which executes the housekeeping tasks (keyboard scanning and clock) normally undertaken by the Spectrum interrupt system, and then tests the BREAK key (using the ROM routine at 1F54 hex). If this is pressed, an error 'L BREAK into program' is caused by a jump to address 8 (Restart 8 resets both machine and floating-point calculator

stacks, giving a 'clean' jump to Basic). The system is also returned to the usual, mode 1, interrupts, otherwise the routine tends to interrupt itself, with unpredictable results.

The two short routines at 65500 and 65510 decimal turn the mode 2 (extended) system on and off respectively. (NB: the system must be restarted, byUSR 65500, every time it is used, since it is self-disabling.)

The routine can't cope with:

- (i) Hardware crashes (an Interface I speciality!)
- (ii) Any situation in which interrupts are disabled (most peripheral operations)
- (iii) Any situation in which other mode 2 interrupts are set up (many machine code games)
- (iv) Any situation in which the system variable ERR-SP is altered

Apart from these restrictions, it makes a very useful tool to have loaded, especially for debugging that latest machine code masterpiece that will keep crashing!

P R Heesom

### LISTING 1 : Z80 SOURCE CODE

```

                ORG D9E1H
9DE1  INTERRUPT:RST 56      FF
9DE2  PUSH AF              F5
9DE3  CALL 1F54H           CD 54 1F
9DE6  JR NC,BREAK          30 03
9DE8  POP AF               F1
9DE9  RETI                 ED 4D
9DEB  BREAK:IM 1           ED 56
9DEE  RST 8                CF
9DEF  DEFB 20              14

                ORG 0FFDCH
FFDC  SWITCH-ON:LD A,15H   3E 15
FFDE  LD 1,A              ED 47
FFE0  IM 2                 ED 5E
FFE2  EI                   FB
FFE3  RET                  C9

                ORG 0FFE6
FFE6  SWITCH-OFF:IM 1      ED 56
FFE8  EI                   FB
FFE9  RET                  C9
    
```

### LISTING 2 : BASIC LOADER

```

10 LET T=0
20 FOR X=55777 TO 55790:READ A:LET T=T+A:POKE X,A:NEXT X
30 IF T<>1976 THEN GOTO 100
40 LET T=0
50 FOR X=65500 TO 65507:READ A:LET T=T+A:POKE X,A:NEXT X
    
```

```

60 IF T<>1174 THEN GOTO 100
70 LET T=0
80 FOR X=65510 TO 65513:READ A:LET T=T+A:POKE X,A:NEXT X
90 IF T=775 THEN SAVE "INTERUPTS" CODE 55777,14:SAVE "INTERUPT2"
   CODE 65500,14:STOP
100 PRINT "Data error - recheck :":LIST 110
110 DATA 255,245,205,84,31,48,3,241,237,77,237,86,207,20
120 DATA 62,21,237,71,237,94,251,201
130 DATA 237,86,251,201
    
```

## BBC UTILITIES

These procedures are all intended to be appended to BBC Basic programs by being \*LOADED at address (TOP-2). Typing OLD will then incorporate the procedure into the program (see BBC *User Guide*, pages 402-403). Minor adjustments may be necessary for given applications.

Familiarisation with most of these procedures can be done with little more than a PROC call and an END. The procedures will work on Basic 1 and OS 1.2, and should work on both the BBC and Electron. **F Timer:** adds together two items, on a 12-hour clock. The times must be in REAL format, with the minutes forming the decimal part, for example 8.45 + 0.15 = 9.15

**P Error:** error—handling routine, used to allow controlled abortion of program. Needs to be customised for particular applications, but can be used, for example, to close files, disable printers, return edit function, and so on. Also prints out the line at which the error occurred, allowing speedy editing and correction. Must be enabled by having ON ERROR PROCerror as (preferably) the

first line of the program.

**P Load:** to get and validate the file name of an input data file. The file is then \*LOADED at &3000, to allow data to be read using indirection (or possibly P. ReadIn). The address of the top of the data file is stored in 'memtop'. Could be modified fairly easily to save data to file in the same fashion.

**P Keyscan:** a keyboard scan routine that uses INKEY (0) to avoid holding up a program. Four parameters are required: format% — selects valid characters to be read x%, y% — TAB (x%,y%) print position nchars% — the maximum length of the input line

The routine prints out the line input, and allows deletion of characters until RETURN is pressed, when the flag return% is set TRUE and the input is put into variable com\$. The value of format% determines what inputs are allowed. A value of 0 reads any character from the keyboard, 1 turns lower-case letters to upper-case, and 2 allows numerics only. The routine must have variables initialised before use: com\$=STRING\$(255, " ");wipe%=TRUE

S L Williams

```

30000 REM FTimer
30010 :
30020 REM [PROCEDURE]F.Timer
30030 :
30040 DEF FTimer(olddtime,time)
30050 REM add times together in REAL format
30060 REM eg add 8.45 + 0.30 = 9.15
30070 :
30080 LOCAL KZ
30090 newtime=olddtime+time
30100 KZ=newtime:REM store integer value
30110 mins=newtime-KZ:REM get the mins
30120 IF mins>0.595 THEN newtime=newtime+0.4
30130 KZ=newtime:REM store integer value
30140 IF newtime>12.595 THEN newtime=newtime-12:REM 12 hour clock
30150 newtime=newtime
    
```

Fig 1 F Timer program



```

30000 REM PROCError
30010 :
30020 REM [PROCEDURES]P>Error
30030 :
30040 DEFPROCError :REM error handling routine
30050 :
30060 REM Flush all buffers, Close Files
30070 REM and disable printer. Then print
30080 REM error line.
30090 :
30100 DIM char 10
30110 *FX4,0
30120 CLOSEE0 :REM close all files
30130 VDUS :REM disable printer
30140 VDUT: PRINT "ERROR! - Any key to continue" :A=GET
30150 VDUT2,7
30160 REPORT: PRINT;CHR#13;"at line " :EEL
30170 IF ERR=17 THEN END :REM allow escapes
30180 PRINT
30190 error="L."+STR$(EEL)+CHR#10+CHR#10+CHR#13
30200 *FX15,1
30210 FOR IZ=1 TO LError$
30220 A=ASC(MID$(error$,IZ,1))
30230 $char="FX15B,0,"+STR$(A)
30240 XZ=char MOD 256
30250 YZ=char DIV 256
30260 CALL &FFF7
30270 NEXT
30280 END
30290 ENDPROC
>

```

Fig 2 P Error program

```

30000 REM PROCload & PROCgetfile
30010 :
30020 REM [PROCEDURES]P.Load
30030 :
30040 DEFPROCload
30050 REM Verify and *LOAD a file
30060 REM file is loaded at &3000 and reaches
30070 REM to "memtop"
30080 :
30090 DIM file 20
30100 PRINTAB(0,20)SPC(30)
30110 REPEAT
30120 PROCgetfile :REM check filename
30130 file%OPENIN(filename%)
30140 IF file%=&0 THEN PRINTAB(0,20);CHR#13;"File not found":VDUT7:A=INKEY(200)
30150 UNTIL file%>&0 :memtop=&3000+EXT$(file%):CLOSEE0
30160 REM now shove it to DSCL1
30170 $file="LOAD "+filename%+" 3000"+CHR#13
30180 XZ=$file MOD 256
30190 YZ=$file DIV 256
30200 CALL &FFF7
30210 ENDPROC
30220 :
30230 DEFPROCgetfile :REM check filename
30240 REPEAT
30250 REPEAT
30260 PRINTAB(0,20)SPC(30)
30270 VDUT:PRINTAB(0,20);CHR#13;"Filename "
30280 INPUT filename%
30290 UNTIL LEN filename% <= 9 :REM check length
30300 IF LEN filename% > 7 AND MID$(filename%,2,1)<>"." THEN valid% = FALSE ELSE v
30310 UNTIL valid%
30320 ENDPROC
>

```

Fig 3 P Load program

```

30000 REM PROCkeyscan
30010 :
30020 REM [PROCEDURES]P.Keyscan
30030 :
30040 DEFPROCkeyscan(format%,x%,y%,nchars%)
30050 REM scan keyboard for input line "com%"
30060 REM format% selects characters read -
30070 REM format%=0 gives "any key" read
30080 REM format%=1 gives "no lowercase" read
30090 REM format%=2 gives numerics only
30100 REM x% & y% are the input print positions
30110 REM nchars% = maximum length of input string
30120 :
30130 REM initialise with "com%=STRING$(255," ") :wipe%=TRUE" before use
30140 :
30150 LOCAL A,IX
30160 return% = FALSE
30170 IF wipe% THEN PRINTAB(x%,y%);SPC(LEN(com%)+3) :com%="" :wipe% = FALSE ELSE
PRINTAB(x%,y%);"" :
30180 A=INKEY(0) :REM read any key
30190 IF A=-1 THEN ENDPROC
30200 IF format%=1 AND (A>96 AND A<123) THEN A=A-32 :REM no lowercase
30210 IF format%=2 AND A<13 AND A<127 AND (A<48 OR A>57) THEN ENDPROC
30220 A$=CHR$(A)
30230 IF A$=CHR#127 AND LEN(com%)>0 THEN com%=LEFT$(com%,LEN(com%)-1) :REM dele
te
30240 IF A$<>CHR#127 AND A$<>CHR#13 AND LEN(com%)=nchars% THEN SOUND1,-15,150,2
30250 IF A$<>CHR#127 AND A$<>CHR#13 AND LEN(com%)<nchars% THEN com%com%+A$
30260 IF A$=CHR#13 THEN return%=TRUE :wipe%=TRUE
30270 PRINT:com%:" ";VDUB
30280 ENDPROC
>

```

Fig 4 P Keyscan program

## MEMOTECH PANEL EXPANSION UTILITY

Anyone who has spent time roaming around their memory via the PANEL command will find this assembler program of much use, as it allows the disassembled code to be printed out by using the

system variable FEXPAND.

A point to note is that this program is designed for use with the DMX80 printer; other printers may require a different bit check in the status routine (see your printer manual for further details). This program is executed (after typing RUN to reset the FEXPAND variables) by entering PANEL, then using the list command L to disassemble an area of RAM. Execution of the utility then requires only a press of the P key (make sure your printer is switched on!), and you get an

instant hard copy.

For details of how to enter this program into your machine, see the assembler section of the Memotech manual.

### Program notes

The program is label-driven and is totally independent of its position in memory, hence the lack of memory locations to the left of the assembler. Consequently, the program will run on any MTX regardless of its memory capacity.

This program was written by a member of the Memotech Owners' Club. Anyone wishing to enquire further about the activities of the club should send an SAE to: MOC, 23 Denmead Rd,

Harefield, Southampton SO2 5GS. The annual subscription is £7. Any other Memotech submissions are always welcome.

### Label explanations

STRT-FINI : set system variable FEXPAND  
PANEL : check for P key press  
START : main program loop  
**Subroutines**  
LADDR : set VPD to VRAM read mode  
DUMP : set screen width to 29 characters  
LOOP2 : read screen and send to printer  
BUFFER/STATUS : output to printer  
LPRINT : cause line feed and carriage return  
WAIT/LOOP1 : idle loop

```

;
; PANEL LPRINT DUMP
;

```

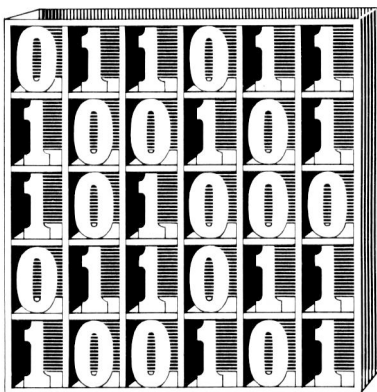
```

STRT:      LD A,&C3      : jump code for panel
                        : extension
                        LD (&FA9E),A
                        LH HL,PANEL : address for panel extension
FINI:      LD (&FA9F),HL : set fexpand
PANEL:     CP &F50      : is key 'P'
                        RET NZ      : if so then continue
                        LD A,14      : screen lines
                        PUSH AF
                        LD HL,&1C00 : start of name table in VRAM
                        LD DE,40     : skip to next screen line
START:     CALL LADDR    : set up address for VRAM
                        : read
                        CALL DUMP    : print out one line
                        POP AF
                        DEC A        : keep line countdown
                        CP 0         : has it finished
                        RET Z       : finish routine after 14 lines
                        PUSH AF
                        ADD HL,DE    : address of next screen line
LADDR:     JR START      : do until finished
                        LD A,L       : set up VRAM address
                        OUT (2),A    : LS byte first
                        LD A,H       : now set MS byte
                        OUT (2),A
                        CALL WAIT    : timing pause for VDP
                        RET
DUMP:      LD B,29       : set screen width for dump
LOOP 2:    IN A,(1)      : read screen character
                        CALL WAIT   : pause
                        CALL BUFFER  : load printer buffer
                        DJNZ LOOP2   : get next character
                        CALL LPRINT  : LPRINT one line of the
                        : screen

                        RET
BUFFER:    OUT (4),A     : latch char into printer buffer
STATUS:    IN A,(4)      : is PTR ready
                        AND &F1     : ready bit check
                        JRNZ,STATUS
                        CALL WAIT   : pause for printer
                        IN A,(0)     : strobe data into printer
                        : buffer
                        CALL WAIT   : pause
                        IN A,(4)    : reset strobe signal
                        RET
LPRINT:    LD A,10       : line feed
                        CALL BUFFER : send to printer
                        LD A,13     : carriage return
                        CALL BUFFER : send
                        RET
WAIT:      PUSH BC       : pause for a period
                        LD B,50     : of time to allow
LOOP 1:    DJNZ LOOP1    : the printer and the
                        POP BC      : VRAM to respond
                        RET

```





*David Barrow presents more documented machine code routines and useful information for the assembly language programmer. If you have a good routine, an improvement or conversion of one already printed, or just a helpful programming hint, then send it in and share it with other programmers. Subroutines for any of the popular processors and computers are welcome but please include full documentation. All published code will be paid for. Send your contributions to Sub Set, PCW, 62 Oxford Street, London W1A 2HG.*

## Z80 SOUNDEX

SOUNDEX from John Hardman of Welling (alias J500 H635 of W452) is a Z80 implementation of the 'Soundex' system — a fairly reliable method of coding inexact data which dates back to the US census of 1890. Incidentally, John doesn't think a computer was used at the time, and he is quite right, but the 1890 census does figure prominently in computing history nonetheless. It was the head count which killed the bookmark trade by introducing Herman Hollerith's punched cards to an unsuspecting world.

The Soundex system works by encoding names or similar data as a sequence of one letter and three digits, with truncation or zero padding as necessary. Encoding a heard name follows six rules:

- 1 Write the name as you think it is spelled.
  - 2 Retain the first letter.
  - 3 Ignore spaces, punctuation and non-codable letters.
  - 4 Replace second and subsequent letters by their group code:
- group 1: BFPV
  - group 2: CGJKSXZ
  - group 3: DT
  - group 4: L
  - group 5: MN

- group 6: R
- 5 Delete consecutive repeat digits.
- 6 Truncate or append zeros to give a four character result.

The method produces identical codes for phonetically similar names, simplifying reference where idiosyncratic spelling can be a problem; for example:

- code B650: Barney, Bernie, Bram, Brian, Bronwen.
- code J500: Jamie, Jan, Jane, Jenny, Jimmy, Joan, John.
- Jean, Jemima, Jennie,
- code J520: James, Janica, Johannes, Jonas.
- code S363: Stewart, Stuart.
- code T320: Thaddaeus, Thaddeus, Theodosius.

John suggests an ideal modern use for the system — dealing with telephoned orders or queries from existing customers. How often have you fumed at the time wasted in having to spell both your name and address on a peak-rated long-distance call? A quicker response is possible, preventing aggravation and keeping charges low, if customer accounts can be accessed by a Soundex code key formed from the received sound of the name and address. And, of course, a name spell request is out of the question when processing after-hours orders left on an answering machine.

## DATASHEET 1

```

=====
;= SOUNDX Convert name to 4-character Soundex code.
=====
;JOB To encode a name or other word data as a one-letter,
; three digit sequence where phonetically similar data
; results in identical code.
;ACTION WRITE '0000'. Reset write-pointer.
; count = 0.
; READ (upper-case) char.
; IF char >= 'A' OR char <= 'Z' THEN:
; [ REPEAT:
; [ WRITE char.
; count = count + 1.
; IF count < 4 THEN:
; [ lastchar = char.
; REPEAT:
; [ READ (upper-case) char.
; IF char <> term. THEN:
; [ tabcount = 6
; REPEAT:
; [ READ tabchar.
; IF tabchar = tabgroupterm THEN:

```

```

; [ tabcount = tabcount - 1. ] ]
; UNTIL tabcount = 0 OR tabchar = char.
; char = tabcount + '0'. ] ]
; UNTIL char <> lastchar OR char = term. ] ]
; UNTIL count = 4 OR char = term. ] ]
=====
;CPU Z80
;HARDWARE Memory containing source data. RAM destination area.
;SOFTWARE None.
=====
;INPUT DE addresses 1st byte of source data.
; Source must begin with a letter.
; Source must terminate with null (00H).
; HL addresses 1st byte of 4-byte destination area.
;OUTPUT All registers unchanged.
; Destination area contains Soundex code of source.
; (If source begins with a non-letter character, then
; code '0000' is returned in destination.)
;ERRORS No check for destination overwrite of source.
;REG USE DE HL
;STACK USE 12
;RAM USE None.
;LENGTH 100 (77-byte code + appended 23-byte table).
;CYCLES Not given.
=====
;CLASS 2 *discreet *interruptable *promisable
;****-- *reentrant -relocatable -robust
=====
;
;SOUNDX PUSH DE ;Save source and D5
; PUSH HL ;destination pointers. E5
; PUSH BC ;Save registers and flags C5
; PUSH AF ;for use in SOUNDX. F5
;
; PUSH HL ;Save destination pointer and E5
; LD B,4 ;use to set 4-byte destination 06 04
; LD (HL), '0' ;to '0000' by loop setting 36 30
; INC HL ;each byte to '0' in turn. 23
; DJNZ CLEARL ;Repeat for four bytes. 10 FB
; POP HL ;Readdress destination start. E1
;
; LD A,(DE) ;Get 1st source character and 1A
; AND 0DFH ;convert any lower case to E6 DF
; CP 'A' ;upper case. Test if a letter FE 41
; JR C,SXEXIT ;within range 'A' to 'Z'. 38 34
; CP 'Z'+1 ;exiting with code = '0000' FE 58
; JR NC,SXEXIT ;if it is outside the range. 30 30
;
;STORE LD (HL),A ;Store letter or code digit 77
; INC HL ;and index next dest. byte. 23
; INC B ;Count one byte done, then 04
; BIT 2,B ;test if four done and CB 50
; JR NZ,SXEXIT ;exit, complete if so. 20 29
;
;SAVECH LD C,A ;Save last character or code. 4F
;NEXTCH INC DE ;Index next source char. 13
; LD A,(DE) ;and get in A. 1A
; OR A ;Test for source terminator B7
; JR Z,SXEXIT ;and exit, complete if so. 28 23
;
; AND 0DFH ;Else, ensure upper case. E6 DF
; PUSH HL ;Save dest. pointer & count E5
; PUSH BC ;and saved char. for use C5
; LD B,6 ;indexing 6-group table. 06 06
; LD C,A ;Save char. for table search. 4F
; LD HL,SNXTAB-1 ;Address SOUNDX table. 21 10 hi
;
;TABLP INC HL ;Point to next table byte 23
; LD A,(HL) ;and get entry in A. 7E
; OR A ;Test for group terminator B7
; JR NZ,CMPRCH ;and compare chars. if not, 20 04
;
; DJNZ TABLP ;Repeat for next group but 10 F9
; ;end, A=0, if all six done. 10 06
;
;CMPRCH CP C ;Compare with source char. B9
; LD NZ,TABLP ;and try again if no match 20 F4
; JR A,B ;else A = group code 1 to 6 78
; ADD A,'0' ;as ASCII digit '1' to '6'. C6 30
;
;TLPOUT POP BC ;Restore last char. or code, C1
; POP HL ;& dest. count and pointer. E1
; CP C ;Compare code with last code B9
; JR Z,NEXTCH ;and discard if the same. 28 DD
;

```



```

OR A :if A=0 then ignore source 87
JR Z,SAVECH :character and process next, 28 D9
JR STORE :else write it and do next. 18 D0

;
SXXIT POP AF :Restore flags and registers F1
POP BC :used in SOUNDX. C1
POP HL :Restore destination and E1
POP DE :source pointers to start. D1
RET :Exit SOUNDX, code found. C9

;
SNDTAB DEFB 'R' :Group code 6. 52
DEFB 0 :Group terminator. 00
DEFB 'MN' :Group code 5. 4D 4E
DEFB 0 :Group terminator. 00
DEFB 'L' :Group code 4. 4C
DEFB 0 :Group terminator. 00
DEFB 'DT' :Group code 3. 44 54
DEFB 0 :Group terminator. 00
DEFB 'CGJ' :Group code 2. 43 47 4A
DEFB 'KS' : 4B 53
DEFB 'XZ' : 5B 5A
DEFB 0 :Group terminator. 00
DEFB 'BF' :Group code 1. 42 46
DEFB 'PV' : 50 56
DEFB 0 :Group terminator. 00
;=====

```

## 8086 DISPLAY MAINTENANCE

Our first code for the Intel 8086 (and its 8-bit databus stable mate, the 8088) comes from B J Clayton of Bexleyheath. SCNUPD is a routine to maintain a display which may be independent of the system, perhaps at the far end of a serial line. The routine works by rapidly checking the ASCII codes in an update screen buffer (containing recent input) against those of a current screen buffer (present display state). On finding an updated character, it escapes from the repeating CMPSB instruction, calculates the character's line and column position and outputs it to a display cursor subroutine, outputs the character's ASCII code to a display print subroutine and copies the character to the current screen buffer.

Having found one updated character, SCNUPD intelligently check the highly

probable condition of an updated following character. In this case calculation and output of the cursor position is unnecessary. The secondary loop NCHAR, which needs only to change the character at each incremented cursor position, continues iteration until a non-updated character is found, when the quick buffer scan is resumed.

Z80 and 8080 programmers might look with envy at the two single-byte instructions which perform the quick buffer scan. The combined REPZ: CMPSB operation executes in  $11 + 22 * CX$  clock cycles (T states) with the following iterative sequence:

- 1 Exit sequence if  $CX = 0$ .
- 2 Service an interrupt request.
- 3 Compare the memory bytes addressed by  $DS * 16 + SI$  and  $ES * 16 + DI$ , setting Overflow, Sign, Zero, Half-carry, Parity and Carry-result flags.
- 4 Increment or decrement  $SI$  and  $DI$ .
- 5 Decrement  $CX$ .
- 6 Exit sequence if Zero flag = 0 (bytes differ).

## DATASHEET 2

```

;=====
; SCNUPD Intelligent screen update.
;=====
;JOB To rapidly scan an update screen buffer for changes,
; if found, update screen and current screen buffer.
;ACTION Initialise count = characters
; REPEAT:
; [ REPEAT:
; [ Compare buffer bytes and increment pointers.
; Decrement count. ]
; UNTIL bytes differ OR count = 0
; IF bytes differ THEN:
; [ Calculate screen cursor position from count.
; Output cursor position.
; REPEAT:
; [ Copy updated byte to current buffer.
; Output updated byte, incrementing cursor.
; Compare buffer bytes.
; IF bytes differ THEN:
; [ Increment pointers.
; Decrement count. ] ]
; UNTIL count < 0 OR bytes match. ] ]
; UNTIL count < 1.
;=====
;CPU 8086 / 8088
;HARDWARE 1920-byte current screen buffer in RAM.
; 1920-byte update screen buffer in RAM.
;SOFTWARE PSNCSR - Routine to position cursor on screen with
; input AL = line number, AH = column number
; (home position is line 0, column 0).
; OUTCH - Routine to print ASCII character in AL to

```

```

; current cursor position and update cursor
; to next screen position.
; (PSNCSR and OUTCH must not alter CX, SI or DI and
; must be in same code segment as SCNUPD.)
;=====
;INPUT ES:DI addresses first character (low memory) of
; current screen buffer.
; DS:SI addresses first character (low memory) of
; update screen buffer.
; DF must be reset (0) for auto-increment in CMPSB.
; OUTPUT Flags altered. All other registers unchanged.
; Update characters output to screen and copied to
; current screen buffer.
; ERRORS Screen cursor at last character changed + 1.
; If DF flag = 1 on input, then DI and SI are
; decremented during CMPSB operation and memory below
; the update and current buffers is compared.
; No check is made for unprintable characters output
; through OUTCH misaligning screen and buffers.
; REG USE PSW ES:DI DS:SI
; STACK USE 12 + subroutine stack use.
; RAM USE None.
; LENGTH 55
; CYCLES The following example timings (a) to (d) are for the
; 8086 and include wait times only for instruction
; fetches on entry and after sequence changes.
; (a) no update (minimum time):
; 42385,
; (b) 1 character update:
; 42648 to 42659 + PSNCSR + OUTCH,
; (c) 1 full line update:
; 49341 to 49352 + PSNCSR + 80 * OUTCH,
; (d) full screen update:
; 205738 to 205749 + PSNCSR + 1920 * OUTCH.
;=====
;CLASS 2 -discreet *interruptable *promable
; -*-*- -reentrant *relocatable -robust
;=====
; CLMNS EQU 80 :Screen line length.
; TCHAR EQU CLMNS * 24 :Screen total characters = 1920.
; SCNUPD PUSH SI :Save update buffer pointer 56
; PUSH DI :and current buffer pointer. 57
; PUSH AX :Save primary accumulator, 58
; PUSH CX :counter accumulator 51
; PUSH BX :and secondary accumulator. 53
; MOV CX,TCHAR :Initialise character count. B9 80 07
; QSCAN REPZ :Repeat following comparison F2
; : decrementing count in CX
; : until character count = 0
; : or compared bytes differ.
; CMPSB :Compare current buffer byte
; : with update buffer byte and
; : inc or dec ptrs DI & SI.
; JZ EXIT :End if no difference found. 74 25
; MOV AX,TCHAR - 1 :Calculate buffer position
; SUB AX,CX :of differing update byte. 29 C8
; MOV BX,CLMNS :Divide position by columns, 8B 50 00
; IDIV BX :giving AL = row, AH = col., F6 FB
; CALL PSNCSR :set print routine cursor. E8 dL dH
; MOV AL,[SI-01] :Get update character in AL. 8A 44 FF
; NCHAR SEG ES :{(Correct segment) copy new
; MOV [DI-01],AL :char to current buffer and
; CALL OUTCH :send it to print routine. E8 dL dH
; MOV AL,[SI] :Get next update char and
; SEG ES :{correct segment) compare
; CMP AL,[DI] :with current char. If no
; JZ QSCAN :change then do quick scan. 74 DE
; INC SI :Else new char in AL, so
; INC DI :bump buffer pointers and
; DEC CX :dec character count. Exit
; JL EXIT :if past buffers, else go
; JMP NCHAR :copy and output new char. EB EB
; EXIT POP BX :Restore accumulators 5B
; POP CX :used in SCNUPD. 59
; POP AX : 58
; POP DI :Restore current and update
; POP SI :pointers to buffer start. 5F
; RET :Exit, screen updated. C3
;=====

```

## MODE FLAGS

The 8086 has instructions which auto-increment or auto-decrement depending on the state of a direction flag DF. Like the decimal flag D, which causes the 6502 to perform binary or BCD arithmetic, the 8086 DF flag sets an operating mode which changes the meaning of some instructions.

The unknown state of a mode flag can cause errors

within stand-alone subroutines. Unless it is explicitly set or reset at the start of the routine, it becomes a necessary input condition. This may be fine when the subroutine is written to be an integral part of a complete program and the mode state is controlled. However, general purpose library routines — the Subset Class 1 standard — should operate correctly in unknown conditions and can only do that by controlling their own mode state.

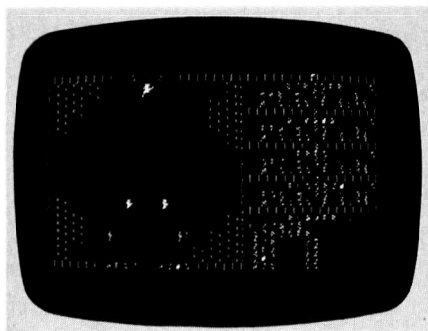
END



# SCREENPLAY



*Twice is not enough — the third episode in the Ultima story kicks off this month's selection of the best games around for the Atari, Commodore 64 and Spectrum. Stephen Applebaum is your intrepid fall-guy.*

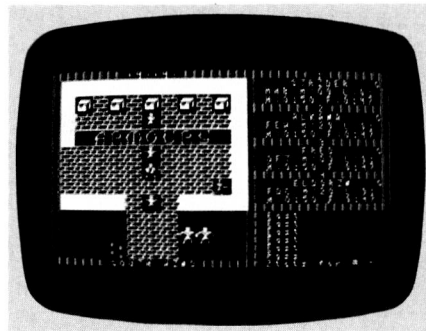


## For a little peace . . .

**Title:** Ultima III: Exodus  
**Computer:** Atari, Commodore 64 (and others from Softsel only)  
**Supplier:** Softsel, US Gold  
**Format:** Disk  
**Price:** £49.95 (Softsel), £19.95 (US Gold)

Traveller, beware — something stirs in the land of Sosaria. The hard-earned peace, fought for many moons ago, has been shattered by a devouring evil. Once more the sound of Orc drums, banished from Sosaria with the fall of Mondain and Manax, has pierced the calm air, striking terror into the hearts of the happy and prosperous subjects of Lord British.

Little is known about the new protagonist, the only clues are the babblings of a fright-stricken old man, an incomplete cloth map and the word



'Exodus', scrawled in blood on the deck of a wrecked ship. As you are the chosen one, it is up to you to make sense of these cryptic clues and banish the evil from Sosaria forever.

The quest starts with the player defining a number of characters who will fight for Lord British. Up to 20 individuals can be selected from the five races that inhabit Sosaria: Human, Elf, Dwarf, Bobbit and Fuzzy.

When all the characters have been chosen, they can be divided up into groups of four. These 'parties' are far more reliable than a single, loner character as all the members are able to rely on each other, making them collectively stronger in battle.

The land of Sosaria is vast and contains many towns (usually the first stop-off point) where armour, weapons, food and other provisions can be bought, and snippets of information gained from some of the

inhabitants. As well as the mostly friendly towns, a party is likely to stumble across one of the many dungeons dotted over the land.

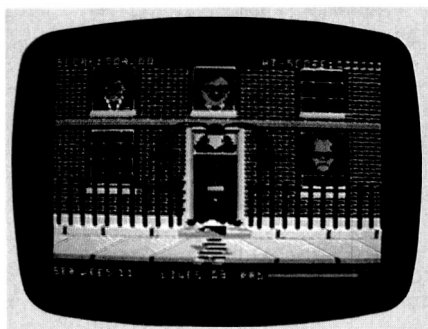
For the most part a dungeon is depicted as a now-familiar 3D maze. Although they are dangerous places, and hold death for unwary travellers, the dungeons are often a source of help and players will have to visit them if they are to complete Ultima III.

The greatest problem facing the explorer are the other nasties that inhabit the land. Most of these will engage you in combat, so you have to make sure that all your characters are armed with either weapons or magic.

A battle is depicted by a special combat screen, showing both the player's party and their assailants. Skirmishes often involve hand-to-hand combat as well as spells being thrown back and forth.

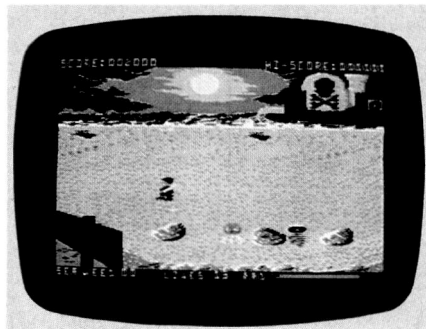
If you see that one of your characters is going to die, it is best to restore the game and go back to your last saved position. Although this sounds drastic, it is a good idea because when a character is killed, the program wipes it from the playing disk completely, making you one man short. The only way to return the group to full strength is to restart the game from scratch.

Unfortunately, I can't describe the whole of Ultima III as it's such a complex adventure. I hope, however, that this small taster has been enough to whet your appetite for more.



## Ethics? What ethics?

**Title:** Seaside Special  
**Computer:** Commodore 64  
**Supplier:** Task Set



**Format:** Cassette  
**Price:** £6.90

Anarchical bad taste is the best way to describe Seaside Special, a game

which unashamedly pokes fun at Maggie's cabinet — the one made up of MPs that is, and not the one containing Dennis' drinks.

On a moral level Seaside Special, which involves bumping off figures such as Norman Tebbit and Nigel Lawson with radioactive seaweed, might appear rather unethical, especially in the wake of the Brighton bombing. Taken for what it is, however, Seaside Special is nothing more than a great piece of surrealist fun, a kind of computerised *Spitting Image*.

Unfortunately, the game's writers do not have the affrontery of the *Spitting Image* team and have concocted a ludicrous *Invasion of the Body Snatchers*-type scenario so as not to cause



offence. The political caricatures are not in fact MPs at all, but Polytikians: alien clones intent on polluting the earth's seas with radioactive waste.

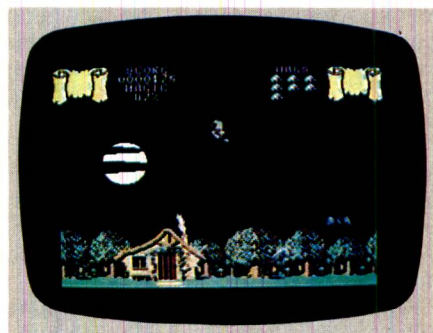
Seaside Special opens on Rotaway beach, once the quiet resort of Rothsay. Since the arrival of the Polytikians, the beach has become a radioactive wasteland and inhabited by a few boulders, the odd crab, a wobbly green thing and a patrolling soldier. As the sea gently washes in and out accompanied by a relaxing whooshing sound, it deposits clumps of irradiated seaweed onto the

sand. Your task is simply to gather up at least 10 of these to use as ammo against the aliens.

Of course, the local fauna is none too happy with the situation. As a result you could be shot in the rocks by a soldier, poisoned by the wobbly green thing or just plain killed by overexposure to the polluted water. Subsequent levels include further dangers such as quicksand, a hungry albatross and more green things, all out to get your hide.

When you have enough ammo it's on to Downing Street for a showdown with

the meanies. The display features the front of No 10 whose five windows open and close to reveal a famous (infamous?) face. Throwing seaweed at the Polytikians turns them different colours until they finally turn blue (blue, Tory. Geddit?) and die. While you're throwing your deadly flora the Polytikians happily hurl ballot boxes, missiles and a whole host of political clichés in an attempt to divert your aim. When the minions have been disposed of, Maggie herself appears, complete with blue rinse for the final conflict.



## The witching hour

**Title:** Cauldron  
**Computer:** Commodore 64,  
Spectrum 48K  
**Supplier:** Palace Software  
**Format:** Cassette  
**Price:** £7.99

'Hubble, bubble, toil and trouble...' no, this isn't Shakespeare Corner, but rather a way of introducing Cauldron, an impressive new game from the creator of the much-hyped Evil Dead.

If you were disappointed with Richard Leinfellner's previous offering, and let's face it, most of us were, then

Cauldron should change your mind about this young programmer's ability. Although it draws heavily on both Defender and Manic Miner, Cauldron's excellent graphics take it way out into a class of its own.

Cauldron begins outside a pleasant little cottage situated in an idyllic forest. Everything would be perfect if it were not for the bats, ominously flapping about above the trees, and the appearance of a witch at the cottage's front door. With the aid of a joystick the witch can be made to take flight on her broomstick and, darting through the night sky, embark on a quest to become the Halloween witch-queen.

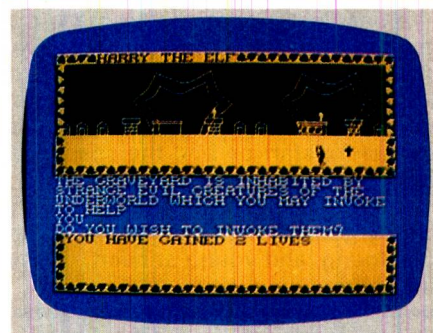
The only way our friendly hag can

become queen is by gathering up six ingredients which, when mixed together in her cauldron, will defeat the reigning Pumpkin king. Unfortunately, all the bits and pieces needed to complete the spell are scattered throughout several underground caverns, all the entrances to which are locked. Luckily, the keys to open the doors have been dropped and are lying around, ready to be plucked by the nearest passing witch.

Unless you are a dab hand with a joystick, you will find Cauldron very difficult to master.

Below ground there are just as many hazards. To get to an ingredient our heroine must bounce from rock ledge to rock ledge, avoiding various flying objects which threaten to put an end to her dreams of holding a ghoulish court.

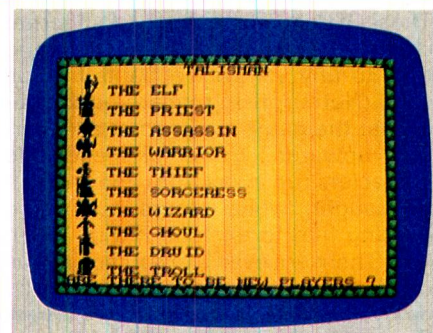
Cauldron is one of the few British games which is graphically on a par with some of the better software produced in the States. The witch looks impressive, zooming across a moonlit sky, while the house, complete with thatched roof and smoke wafting from its chimney, is a real joy to look at. I am looking forward to seeing Leinfellner's next game.



## Crowning glory

**Title:** Talisman  
**Computer:** Spectrum 48K  
**Supplier:** Games Workshop  
**Format:** Cassette  
**Price:** £7.95

Talisman is Games Workshop's answer to Valhalla, and a great one it is too. Unlike its predecessor, Talisman is a multi-player game allowing up to four players, any number of which can be computer controlled, to compete in a magical battle of wits.



The simplicity of Talisman's scenario betrays just how difficult the quest itself is. But for those who like to know who is doing what to whom, here's a quick run-down of the story so far.

The old overlords have been overthrown and evil forces have once again taken over the land. The player's task is to locate the object, in this case the Crown of Command, that will thwart the nasties' dirty deeds.

Before setting out on the quest, each player must first select a character. There are 10 to choose from, ranging from an elf to a sorceress, each one having different abilities. If only one

player is taking part, he can play the game as a straight adventure by selecting a single character. Alternatively, masochists can compete with up to three other computer-controlled personalities. I must warn you that this makes for a very difficult game, and should be avoided by novices.

In play, Talisman is virtually a mirror of Valhalla. The screen is divided into three windows. The top one displays the present location and any characters around at the time, while the middle and bottom windows give the condition of the character of the player whose go it is and detailed pictures of the objects present, respectively.

Another option, selected by pressing SPACE, enables a player to check at a glance the status of all the other characters. I found this useful for checking on their 'health' to see if they were weak enough to risk fighting. As well as the odd punch-up there are various tasks to be completed, puzzles to be solved and friends to be won over. Unfortunately, I did not get far enough into the game to find the Crown of Command, as I was constantly killed



off at an early stage.

Talisman is one of the better interactive adventure games for the Spec-

trum: the graphics are good and the action fast. The fact that it encourages players to actually talk to each other

(gasp!) rather than being glued to some alien-zapping, joystick-thrashing, brain-mashing arcade game, can't be bad.



## Time out

**Title:** World Series Baseball  
**Computer:** Commodore 64, Spectrum  
**Supplier:** Imagine  
**Format:** Cassette  
**Price:** £7.95 (Commodore), £6.95 (Spectrum)

If you are tired of playing American

Football and Mr Wimpey leaves a bad taste in your mouth, take a look at World Series Baseball, a 'new' Imagine game based on our ancestral cousin's butch version of rounders.

WSB is for one or two players and should excite even the most weary games player. The playing area is displayed as a view overlooking a massive sports stadium dominated by a large video screen. A game starts with each team running onto the field and taking up their positions, either batting or fielding.

The player taking the part of the pitcher (bowler) can pitch a ball in one of eight ways, depending on the direction of the joystick. For instance, pushing the stick forward and pressing the fire button releases a 'high ball', while the opposite produces a low ball.

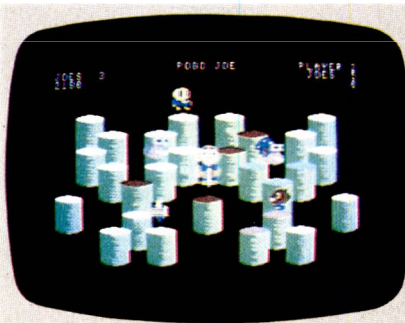
Once a player on the opposing team has decided to make a run, the fielder can try to get him out by throwing the

ball to one of his team-mates who then touches the appropriate base with the ball. Of course, a player can also be caught out.

Batting is rather more difficult than fielding. When a ball is bowled to your man, the giant video screen shows an enlarged side-on view of the ball flying towards the batter. Even with this feature I still found myself either swinging the bat too early or too late, and generally missing the ball.

A nice feature is the 'crowd pleaser' sequence where a line of cheer-leaders, pom-poms and all, run onto the pitch sporting the colours of the home team. After a swift jig they run off to be followed by the two teams.

World Series Baseball is a game which should keep most people happy. I was disappointed with the unimaginative sound effects, but on the whole they were compensated for by the unusual display.



## Bouncing babies

**Title:** Pogo Joe  
**Computer:** Commodore 64, Atari + joystick  
**Supplier:** Softsel  
**Format:** Disk + cassette  
**Price:** £24.90 (Commodore) £24.78 (Atari)

Pogo Joe is another Q\*Bert-type game.

No, wait... don't turn away, this one is really different... promise. Like old Bert, Joe's one enjoyment in life is bouncing around cylinder tops in order to change their colour. 'So what's different?' I hear you cry. Well, the major difference is the excellent screen display, and animation that is far superior to anything else along the same lines, the closest you are likely to come to true arcade quality.

As Joe pogos his way around the screen, several eggs appear amid an impressive explosion of white dust. These hatch into a host of different characters, ranging from toy spinning tops to tiny yellow elephants in blue suits. (Not surprising, when you consider that the game is aimed at six-year-olds upwards.) Some of these little characters run away from Joe and can be caught, while others hunt him, causing him to explode if they touch him. There are even a few mischievous critters which turn a cylinder back to its

original colour when they land on it.

Transport tubes appear in some of the higher screens. These are black-topped cylinders which teleport Joe to another transport tube, avoiding all the monsters. Cylinders with green flashing tops, however, vaporise all the toys when Joe lands on them.

Although I only looked at the Commodore version, Pogo Joe is also available for the Atari. According to the manual the two versions are the same, except for the inclusion of a carnivorous cylinder for Atari users.

A neat inclusion in the program is a menu which allows the player to 'customise' a game to a certain extent. That is, it can be set up for one or two players, with any of the 64 different screens chosen to start on and the speeds of both Joe and the toys defined.

Overall, Pogo Joe is an extremely classy game which should keep both the young, and young at heart, happy for hours.



## Musical construction

**Title:** Rock 'n' Bolt

**Computer:** Commodore 64 + 1/2 joysticks  
**Supplier:** Activision  
**Format:** Disk, cassette  
**Price:** £19.99, £10.99

Rock 'n' Bolt is a complex puzzle based around a building site. As Louie, a construction man, you have to face the challenge of erecting a 100-storey building. The only way to complete the job in quick time and so collect a nice fat cheque at the end, is to rush around with your blueprints, bolting the monolith together, girder by girder.

A practice mode has been included to allow you to take as long as you like.

Harder levels have set time limits in which to complete a floor; any longer and Louie goes through a strange process of disintegration.

While fixing the girders together Louie can pick up a wage bonus by landing on gold bolts, or even gain an extra life by touching a green bolt.

Rock 'n' Bolt is a deceptively simple game on the surface. In play the story is very different, and it doesn't take long before you're sweating with the frustration of not being able to return to the lift to reach the next floor. If frustration leads you to give up Rock 'n' Bolt, just sit back and listen to the great music. It'll soon fire your enthusiasm. **END**





## Ours prints exactly what it's told to as well.

Unlike the proprietors of PRAVDA, we're all for freedom of the press.  
On the other hand, we're certainly not in favour of freedom for the printer.  
We're as critical of documents that don't say exactly what they're  
supposed to as anyone at the Kremlin.

That's why we'd like you to take a look at the new Epson DX100 daisy  
wheel computer printer.

It comes from Epson and will simply not tolerate smudgy, messy type. It  
is also fanatical about towing the computer line as it were.

That's because it has a 5K memory buffer built in.

For those who may not know, a buffer does two things.

First, it allows the DX100 to store more than a page of text while it's still  
printing. Setting your computer free to do other things.

Second, the buffer makes sure that the DX100 does exactly as it's told.

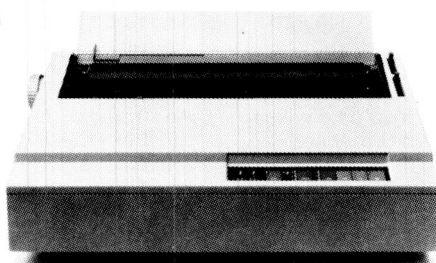
A printer without a buffer can't keep up with the computer. So it has a  
tendency to defect. Leaving your documents with chunks missing. Rather like that.

So get yourself £475 (+VAT) and you can have an Epson DX100 of your  
very own.

You will then be in possession of a printer that firmly subscribes to the  
belief that documents are always better read than dead.

**Home computers and the DX100:** Spectrum QL, BBC model B  
and Acorn Electron are all fully compatible.

**Personal computers and the DX100:** Epson PX-8, HX20  
portables and QX10 desktop, IBM PC, Apricot, Apple and DEC Rainbow are all  
fully compatible.



### THE EPSON DX100 DAISY WHEEL PRINTER £475 (+VAT).

Reveal all about the Epson DX100 and where I can get one, quick.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

PCW/6/85

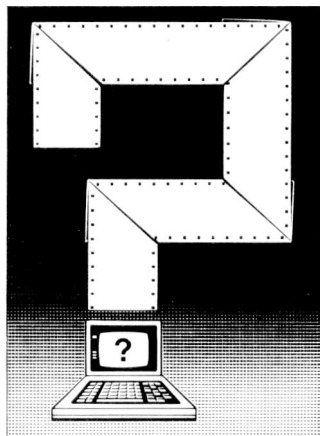
To: Epson (UK) Ltd., Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH or phone Epson Freephone.

# EPSON



# COMPUTER ANSWERS

*Simon Goodwin takes his toolkit to your problems. The address to write to is Computer Answers, PCW, 62 Oxford Street, London W1.*



## Transatlantic power struggle

I am an American currently resident in Britain, and am looking at personal computers. One I have my eye on (the Wren) runs only on 240v power. If I return to the US, I will have to feed it 120v power, so I have two related questions.

Firstly is it possible to rig the 240-120v transformers I use for my American appliances here, to use a 240v computer there? Secondly, is there a single component in the power supply (for example, a transformer) which I might be able to replace in the US?  
**D E Netherton, London N3**

The 'auto-transformers' which are used to convert 240v into 120v should be symmetrical components and thus work in either direction, but I suggest that you check this with a competent electrician in the US.

In theory you can convert most appliances to run on a different supply by changing the internal transformers, but this won't always be a simple one-step modification: modern computers use a variety of supply rails (generally including +12, +5, -5 and -12v), so you may need to replace a number of transformers. Make sure that the replacement components can provide the correct current as well as voltage. At worst, you may find that a specially-made composite transformer is used in the UK machine to generate a range

of different outputs from one mains input. It might be hard to find an exact American equivalent.

There are a number of other points to be born in mind when you plan to take a British computer to the US. You shouldn't use a computer in the US unless it complies with FCC rules for radio interference. British law is much less strict, so most UK machines will need metal or conductive paint screening around the circuit board before they're legal.

Some computers derive timing signals from the UK mains, which alternates at 50Hz, so they'll run at a different speed (if at all) when connected to the 60Hz US supply. Likewise, British television sets and monitors refresh the screen 50 times a second, while their American counterparts expect to be refreshed at 60Hz. In many cases the signal is generated using a 'dual-standard' component, and only one connection need be changed to convert the display, but some machines need major alterations to cope with a 60Hz supply.

Telephone modems use different tones in Britain and the US, so you may find that communications equipment purchased here won't talk to Ma Bell. Again, dual-standard components are probably in there somewhere, but you'll have to find out how to let them know about their change of environment.

It is certainly possible to make a British computer work in the US, but there are lots of things that could go wrong in the process. You'd be wise to avoid machines that are unknown in the US, or you could run into maintenance problems after you get the hardware working. Battery portable machines are obviously going to make the crossing most easily, but you could still run into interfacing problems.

## The Arabian way

Recently, you answered a request to provide information on a computer system running in Spanish. Are there any computers or dealers you can recommend for potential users wishing to

work in Arabic? The ideal system my contacts require would run at the 220 voltage in the Far East, and be capable of presenting both English and Arabic visual displays.

**Dr RP Newton, University College, Swansea**

Most modern computers are capable of displaying Arabic characters, since they allow the character shapes to be redefined at the whim of the user. You draw the characters, dot by dot, with a character design program. Each new definition takes the place of a 'normal' letter or symbol, and you can chop and change between the two sets at will. The exact procedure will vary depending upon your choice of machine — appropriate instructions will accompany the character design program.

But this doesn't get around the problem of data entry, since you presumably need a 'backwards INPUT' routine to accept data entered from right to left. It shouldn't require too much work to implement such a feature, reading characters one by one from a keyboard with appropriate replacement legends.

Ramez Halaby & Co, of PO Box 147, Jeddah, Saudi Arabia, specialises in Arabic computer systems. It has advertised various conversion kits in back issues of PCW including an adaptor and keyboard called 'Arab RAM' for the Sinclair ZX81. This was described as 'the first Arabic Personal Computer in the world' when it appeared a year or so ago. Nearer home, An Arabic conversion kit for the IBM PC is available from Microware, 637 Holloway Road, London, for £600. Microware also offers an 'Arab Word Processor' package at the same price.

## Hacking — the first steps

Where can I get some information about hacking, such as books on the subject, or are there any dealers who specialise in it? What equipment is needed?  
**D Trowsdale, Kingswinford, Dudley**

Defining hacking is difficult these days. What began as a term of praise for an obsessive programmer has acquired a more restricted — and less complimentary — meaning. 'Hacking', as in communicating with other computer systems (with or without the consent of their owners), is a difficult hobby to break into. The hacking community is very tightly-knit, partly because of the strange hours you have to keep if you want to take advantage of the cheapest or least congested connections. Hackers carry out most of their communication — logically enough — by computer, so the best way to contact them is to join them! I don't know of any specialist hackers' shops — the hobby is probably too small and widely dispersed to make them economically viable. The only good book on hacking which I have seen is *The On-line Handbook* by Ray Hammond. It is published by Fontana, and is available for under a fiver from most bookshops.

Before you can become a hacker you need three pieces of equipment: a computer, to accept and display messages; a modem (short for MODulator DEModulator) to convert computer signals into a form which can be transmitted by telephone; and a telephone. A printer — of any kind — will also be very useful.

The computer and the modem generally communicate via the infamous RS232 interface. Low-cost modems sometimes plug directly into the computer without the need for such an interface, but this generally means a reduction in versatility. Similarly, the cheapest computers contain simplified RS232 interfaces which restrict the flexibility of your system. Look for a machine with an interface capable of sending and receiving simultaneously at two different speeds.

There are two types of modem — the acoustic coupler and the direct-connection model. The acoustic coupler is a simple microphone-and-speaker contraption which you fix to your telephone handset. It transmits and receives bleeps, and buzzes down the line.



Unfortunately, it also relays any other background noises in the room at the time, unless you jam it very carefully onto the handset, so the acoustic coupler can be rather unreliable. Direct-connection modems are more expensive but more reliable. They plug directly into the telephone circuit (you'll need one of the new rectangular BT sockets), and electronically generate the whistles and bleeps of computer communication.

Computers communicate at a variety of speeds: a serious hacker will need to be able to use 1200/75, 300/300 and 1200/1200 baud. The first figure refers to the speed of data reception, the second to the speed of transmission. The 1200/75 speed is used by Prestel; 300/300 is favoured by businesses and bulletin boards. These are electronic noticeboards, generally run by amateurs, through which hackers send and receive messages. At 1200 baud it takes about seven seconds to transfer a screenful of information.

To find out more, such as the phone numbers of bulletin boards, read the 'Networks' section of *PCW*. Like so many areas of computing, the only real way to find out about hacking is to try it. Once you have taken the plunge, as in any hobby, you will find lots of people eager to advise you further.

## Colour the Atari

**I have an Atari 600 XL, which has very nice graphics for the price. Unfortunately, the resolution in 16-colour mode is 80 × 192 — it's like painting with a brick!**

**Graphics mode 7 has a resolution of 160 × 96, which is a lot better because each dot is a near-perfect square. Unfortunately again, only four colours can be displayed at once. Is it possible to have 16 colours on screen at the same time, in mode 7 resolution?**

**Richard Donscombe, Denton, Manchester**

The short answer to your question is No, but let's look at the Atari in a bit more detail.

The Atari 600XL is a re-styled version of the Atari 800, launched in 1979. When that machine first appeared it lacked the 16-colour modes — you were stuck with modes 0 to 8, giving five colours in text modes, and two or four colours for graphics. You also had five sprites, or 'player/missiles', and they could each be a different colour, so you

could — in practice — get nine colours onto the screen at a time, although the sprites could only occupy a restricted area.

After a while Atari replaced one of the graphics chips in the 400 and 800 with a device called the GTIA, which had the extra 16-colour modes you mention. However, these were grafted onto the original design. For a long time they weren't documented, and there were restrictions on their use. Now they've popped up, officially, as modes 9 to 11 on the XL machines.

The problem is that Atari has only changed the GTIA chip to give 16 colours in new modes. ANTIC, the other graphics controller in the machine hasn't changed. ANTIC can only read 40 bytes of graphic information in the time needed for the TV display to scan from one edge of the screen to the other. To store 16 colours you need four bits, or half a byte, so you can only get 80 dots onto each line of graphics when using 16 colours. The hardware just can't read the data any faster.

This isn't a criticism of Atari — every micro design has this problem. Machines like the Memotech and Commodore 64 get around it by restricting the number of changes of colour on a line. On the Sinclair QL, the graphics controller can stop and start the processor to give itself more time to scan the display memory. In that case, with 512 dots on each line, each in one of four colours, the processor only gets a look-in 40 per cent of the time. Even a 68008 processor finds that something of a handicap!

You can increase the number of colours on an Atari if you use devious machine code, but it's quite hard work. About a year ago I produced some graphics for a Central ITV series, squeezing just over 100 colours out of a standard Atari, with a resolution of 160 × 192 — but it took me three months to do it in a flexible way. The trick is to write a program which changes the colours used by the Atari as the dot flies down the screen. Since the TV draws each line in about 1/20,000 second, your program has to be very efficient if you want arbitrary colours on each line, and you are still stuck with just four or five colours on a given line.

## Which micro for Cobol?

**Which micros can run CIS**

**Cobol, I am using Micro Focus's version for my Computing A level at college and would find it helpful if I could program at home. A Lake, Edenbridge, Kent**

To the best of my knowledge, CIS Cobol is only available for machines with disks and an Intel-type processor (8080, Z80, 8088, and so on). This rules out a lot of home computers, which use other processors or non-standard disk systems. Any CP/M-80 or CPM-86 machine should run the system, although you might run into problems with lack of memory on a few home computers. A CIS Cobol compiler will set you back about £400.

Cobol is a standardised language, so it might be worth looking at another popular implementation for micros. RM Cobol for the TRS-80 is cheaper than Micro Focus's version, and seems to work just as well. You can pick up a TRS-80 system for next to nothing so it might be worth considering if you're determined to run Cobol at home.

## BBC interfacing problems

**I run a small business in Jamaica and decided to have it computerised. While I was in London, I purchased two BBC Model B computers with disk and printer interfaces, cables, colour monitors and Epson FX80 dot-matrix printers.**

**I am having problems interfacing the computers with the printers. Whenever a print command is to be executed, the CAPS LOCK and SHIFT LOCK lights come on and the computer stops execution.**

**Orlando Budoo, Jamaica, West Indies**

The BBC Micro turns on the two lights whenever it has stopped because a buffer is full. In this case, characters are stored in a buffer before they are printed. Normally, the computer puts characters into the buffer and the printer takes them out, by signalling its readiness to the printer interface. In this case, the machine stops because the printer's signal is not getting through.

The fault could be in the printer hardware, the cable or the computer. Since you've bought two of each, and report no other faults, this explanation is unlikely. The BBC Micro software is

perfectly compatible with the FX80, so we're left with one likely source of error — you.

Printer output on the BBC Micro can be routed to one of two interfaces — the serial (RS423, via a socket at the back of the machine) or the parallel (Centronics, via a more complicated socket under the keyboard). When you turn on the BBC Micro it expects to send printer output to the parallel port. If you've connected up the serial port, the machine will 'hang up' as you describe, since it will wait forever for a signal at the parallel port.

You can switch between the two ports with the command \*FX 5. Type \*FX 5,1 to select the parallel interface, or \*FX 5,2 to select the serial one.

If you have a serial printer, you will probably need to select the correct speed for data transmission. Use the command \*FX 8,N where N is a value between one and eight. Try each value of N until you find one that works. Again, the system will wait forever unless you use the correct speed.

If neither of these tricks work, you've got a hardware problem. Make sure that you haven't fiddled with the switches inside the printer, which tell it the data format it should expect. Try out the computer with any other printer you can lay your hands on. Test the printer with other computers. You should be able to isolate the fault to the printer, cable or computer.

This goes to show how important it is to have a system fully demonstrated before you buy it. Take note of any special commands used when the machine is set up, and always buy the exact hardware you've seen working.

## Help for Aquarius

**With reference to the letter 'Age of Aquarius?' from S Forster, PCW April, Mr G Leboff of Radofin Electronics would be pleased to aid you in your search for books and software for the Aquarius, and help with any queries.**

**Phone (01) 205 0044, or write to Radofin Electronics, Hyde House, The Hyde, London NW9 6LG.**

**END**

*Unfortunately we can't answer questions on an individual basis, so please don't send a SAE with your query.*



# Calling Prestel

*Peter Tootill dials up Prestel this month and looks at the facilities available to the micro user.*

When you join Prestel (or Micronet 800) you will be given three things. An identity number, a password and a telephone number.

When you dial the number (often 618 or 612) you should hear the modem tone. Switch your modem on-line, and after a few seconds you should see a welcoming message from Prestel, and a request to enter your identity number. Some software (and some purpose-made Prestel terminals) can be pre-programmed with the number to save you having to remember it and type it in. The next thing you will be asked for is your password. Provided that all is well (you are allowed three attempts at entering the correct password) Prestel will welcome you by name and tell you when you last used the system. Or rather it will tell you when you last used the particular Prestel computer you are using now — the Prestel system consists of several independent computers which are managed by a central computer. The central computer keeps the other ones up to date by uploading new pages of information at frequent intervals.

If you have problems with strange characters at this stage, check your RS232 settings, one common cause of problems when calling Prestel is that you need to use seven data bits, even parity and one stop bit. This is different to most bulletin boards which are now using eight bits, no parity, one stop bit. This is used because it enables transfer of binary files using the Xmodem protocols.

At this stage you should see the Prestel main menu (Page 0) this contains ten items, but the exact contents vary. If you are a Prestel Microcomputing subscriber, you will normally go straight to the Prestel Microcomputing main menu. In either case you can always find your way to page 0 by pressing \*0# on your keyboard.

## In use

Once you have logged on, Prestel is fairly simple to use. It is based on menus, you select items from the menu by pressing the relevant number on your keyboard (there is no need to press return), you will be taken to the page in question. This may well be another

menu, but you will eventually get to the information you are looking for.

Alternatively, if you know the number of a page that you want, you can go directly to it. Just press 'page-no#' (again there is no need for a carriage return — in fact ordinary Prestel keypads don't have a return key at all). So, if it is page 21 you want to read, press \*21# (which, incidentally will lead you to a useful introductory lesson on using Prestel).

## Information providers

There is a whole range of subjects on Prestel — everything from news and weather to air travel, from what's on at the theatre to government information. The contents are provided by many independent organisations, called 'information providers' or IPs. Each organisation pays Prestel a certain amount for the privilege and if it so wishes it is allowed to charge people to look at the information provided. These charges are added to your Prestel bill. You will find a small price tag at the top of each page stating how much it costs to view it. If a page does have a charge, the menu will tell you how much it is before you choose it. Around 60 per cent of the pages are free.

## CUG's

Some areas are closed off by the IPs to form 'closed user groups' or 'CUG's'. These are areas where the IP will charge a subscription, (in addition to your Prestel subscription) or restrict access in other ways to allow only certain groups of people to look at them. Prestel Microcomputing (which includes Micronet 800 and other micro related IP's) is a CUG. It is the area that is of most interest to micro users, and is indexed from the Prestel main index on page 0. You are presented with a range of options which include news of the micro scene, information about computer clubs, an art gallery, software to download and a range of other items.

This area includes the Micronet 800 and Viewfax 258 sections, which are the two main commercial IPs dealing with micros. It also includes ClubSpot which is an area run entirely by amateurs

*0#	Mainmenu
*#	Repeats last page (can be used up to three times)
**	Cancel if you make a mistake
*00	Repeats current page (useful in cases of line noise, for example, free for chargeable pages)
*09	Repeats current page with any updates made during the viewing period (charged at same rate as the first time you saw the page)
*170#	What's new on Prestel
*1909#	Mailbox directory
*199#	Alphabetical index to subjects and IPs
*2#	The Prestel Gazette
*21#	How to use Prestel
*3#	Local information
*5#	Business information
*6#	Response frame guide
*7#	Mailbox — for sending messages to other users
*800#	Prestel microcomputing
*9#	Customer facilities
*90#	Leave Prestel
*92#	Check your current bill (on the current computer only)
*920#	Change your passwords
*930#	Check for messages to you
*931	Retrieve stored messages

Fig 1 Prestel commands



under the auspices of the ACC (the Association of Computer Clubs). The ACC has the distinction of being only amateur IP on the Prestel database, the pages are provided free of charge by Prestel because the information and facilities provided by the ACC are a big attraction to micro users.

Prestel is a very big database, and it is well worth browsing. If you do find anything of interest make a note of the page number, because it can be very difficult to find your way back. This is

the main problem with Prestel, although there is a subject index, it can be very difficult to find what you want. A keyword search facility would be very useful.

### National Mailbox

I said earlier that when you join Prestel you are given three things, well that should read four. You are also given an account number (sometimes called your 'systel'). This is a number that other people can use to send messages

to you using the Prestel 'Mailbox' facility. This number is the one that you give to friends, and the one that will be published in the Prestel Mailbox directory, if you request it.

Your identity number and password should be kept secret, as anyone who uses them could run up a big bill for you.

If you have messages waiting for you, Prestel tells you this when you logon to the system, you just key 0 to read them. They can be stored, and re-read later at page 931. **END**

### UK free networks

Bulletin Board	Phone Number	Notes
BABBS-Bath	(0225) 23276	300/300 baud rate; 9pm-8am weekdays, 9am-noon weekends; Atari-based system, ring-back system
BABBS-Felixstowe	(0394) 276306	300/300 baud rate; 24 hours daily; Apple users' group
BABBS TWO-Basildon	(0268) 778956	300/300 baud rate; 24 hours daily; Apple users' group with special area for queries to Apple UK
Bettisfield	(094875) 378	300/300 baud rate; 9pm-9am daily; remote CP/M system
Blandford Board	(0258) 54494	300/300 baud rate; 24 hours daily
CABB	(01) 631 3076	300/300 baud rate; 24 hours daily + 1200/75
CBBS SW	(0392) 53116	300/300 baud rate; 24 hours daily
CBBS Surrey (Woking)	(04862) 25174	1200/75 and 300/300 baud rates; 24 hours daily; jokes, jobs, reviews, news
CNOL Lancaster	(0524) 60399	300/300 baud rate; 24 hours daily; Clinical Notes Online service, mainly for medical users; works in conjunction with a database on the Datastar network
Computers Incorporated Newcastle	(0207) 543555	300/300 baud rate; 24 hours daily; primarily business-oriented
Forum 80 Hull	(0482) 859169	300/300 baud rate; 5-11.30pm weekdays, noon-11.30pm weekdays; Bell 103 standard, midnight-8am daily; international electronic mail, library for up/downloading
Forum 80 SPA	(0926) 39871	300/300 baud rate; 11pm-midnight daily; TRS-80 and Genie users' group
Forum 80 Wembley	(01) 902 2546	300/300 baud rate; 7-10pm weekdays, midday-10pm weekdays; electronic mail, library for downloading; ring and ask for Forum 80
Hamnet Hull	(0482) 497150	300/300 baud rate; 6pm-8am daily
Liverpool Mailbox	(051) 4288924	300/300 baud rate; 24 hours daily; electronic mail, program downloading, TRS-80 information; messages for PCW can be left on the board and will normally be read by us within 24 hours
Mailbox-80 W Midlands Stourport	(0384) 635336	300/300 baud rate; 6pm-8am daily
Manchester Open Bulletin Board	(061) 7368449	300/300 baud rate; 24 hours daily + 1200/75
MBBS-Mitcham	(01) 640 2617	300/300 baud rate; 10am-10pm Thursday and Sunday; BBC-based system with jokes, graffiti, electronic mail, and Atari and BBC sections
MG-Net CBBS London	(01) 399 2136	300/300 baud rate; 5-10pm Sunday; electronic mail, program downloading
Microweb Manchester	(061) 4564157	300/300 baud rate; 24 hours daily; <i>Micro User</i> magazine, mainly for BBC users
NBBBS-North Birmingham	(0827) 288810	300/300 baud rate; 24 hours daily
OBBS Manchester	(061) 4271596	300/300 baud rate; weekdays except 7pm-9pm, weekends except 10am-10pm
PIP-Sheffield	(0742) 667983	300/300 baud rate; 24 hours daily. Bell 103 midnight-8am daily
Southern BBS	(0243) 511077	300/300 baud rate; 8pm-2am daily; ring-back system (dial the number, let phone ring once, and then ring back); messages, downloading
Stoke ITEC	(0782) 265078	300/300 baud rate; 24 hours daily; remote CP/M system
TBBS London	(01) 348 9400	300/300 baud rate; 9am-7am daily
TBBS London Metro	(01) 341 7840	300/300 and 1200/75 baud rate (including Prestel compatibility); 24 hours daily; temporary number for the TBBS Nottingham system
WABBS-Worthing	(0903) 42013	300/300 baud rate; 24 hours daily; ring-back system (dial the number, let phone ring once, and then ring back); Atari-based

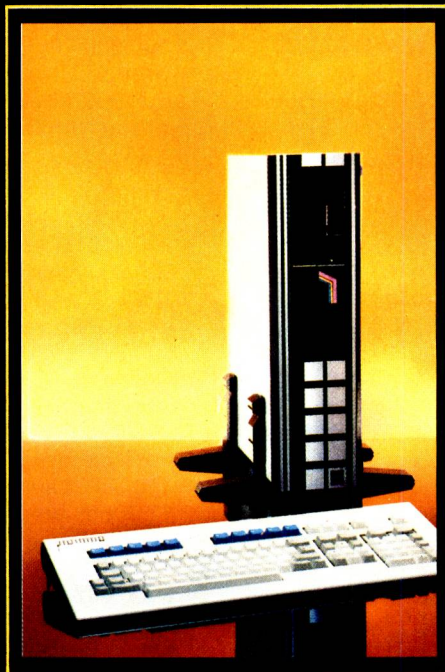


# — three hard disc models

**10<sub>MB</sub>**  
+ 800K FLOPPY



**21<sub>MB</sub>**  
+ 800K FLOPPY



**42<sub>MB</sub>**  
+ 800K FLOPPY



Now U-Micro completes the U-MAN race with new 10, 21 and 42MB (formatted capacity) hard disc models using Rodime drives to add to the basic dual floppy model. RAM from 128K to 1MB (expandable to 15MB) and all the built-in features you need – 68000 CPU (10MHz) with 6809 I/O processor, clock, timers, A/D, speech and sound synthesiser, colour and mono display, graphics, programmable fonts, two serial ports, Centronics port, general

purpose parallel port, superb keyboard and four slot expansion systems. Our 'open information' policy guarantees that you'll always be able to get the most out of the U-MAN Series 1000.

The hard disc software supports both p-system and CP/M68K with disc partitioning and fast floppy back-up utilities. Remember CP/M68K languages are not limited to 64K as are the CP/M86 and MS-DOS languages. And look at the prices – 1MB RAM and 42MB

hard disc system only £6449.00. (128K RAM and 10MB disc £3789).

Dealer, OEM and export distributor enquiries welcomed.

Special deals for software developers even on the GT models.

U-Microcomputers Limited,  
Winstanley Industrial Estate,  
Long Lane, Warrington, Cheshire,  
WA2 8PR, England.  
Telephone 0925 54117  
Telex 8293279 UMICRO G

Dual 800K floppy models  
from £2499.00

*Designed and made in UK.*



 **U-MAN**  
SERIES 1000 

**32 bit supermicro – with hard disc**

making it easy for programmers to make easy to use!

**U-MICRO** 



# Cash & Carry at HI VOLTAGE

## COMPUTERS

### Croydon's New 13,000 sq ft Computer Discount Centre

Expert Staff • Free Advice • Everything on Demonstration • Open 9am-6pm Monday-Saturday • Access & Visa cards accepted

## UK's Best Printer Prices

London's Largest Range of Printers on Demonstration

### DOT MATRIX PRINTERS

Brother HR5	£129.90 + VAT =	<b>£149.38</b>
Brother M1009	£155.90 + VAT =	<b>£179.29</b>
Brother 2024L NLQ	£899.90 + VAT =	<b>£1034.88</b>
Epson P40 Thermal AC/DC	£81.90 + VAT =	<b>£94.18</b>
Epson RX80	£190.90 + VAT =	<b>£219.54</b>
Epson RX80FT+	£215.90 + VAT =	<b>£248.29</b>
Epson FX80	£329.90 + VAT =	<b>£379.38</b>
Epson RX100FT	£349.90 + VAT =	<b>£402.38</b>
Epson FX100	£427.90 + VAT =	<b>£492.09</b>
Epson LG1500 NLQ	£895.90 + VAT =	<b>£1030.28</b>
Epson JX80 Colour	£449.90 + VAT =	<b>£517.39</b>
Canon PW1080A NLQ	£289.90 + VAT =	<b>£333.39</b>
Canon PW1156A NLQ	£365.90 + VAT =	<b>£420.79</b>
Canon PJ1080A Colour	£479.90 + VAT =	<b>£551.88</b>
Panasonic KP1091		

(IBM) NLQ	£255.90 + VAT =	<b>£294.29</b>
Shinwa CPA80	£199.90 + VAT =	<b>£229.88</b>
Anadex	POA Oki	POA
Data Prods. Paper Tiger	POA NEC	POA
Newbury	POA Tec	POA
Seikosha GP50S		
(Sinclair Spectrum)	£79.90 + VAT =	<b>£91.88</b>
Seikosha GP500A	£113.90 + VAT =	<b>£130.98</b>
Smith Corona Fastext 80	£149.90 + VAT =	<b>£172.39</b>
Smith Corona D100, D200 NLQ & D300 NLQ	POA	
Star SG510 (IBM) NLQ	£225.90 + VAT =	<b>£259.79</b>
Kaga Taxan KP810 NLQ	£259.90 + VAT =	<b>£298.89</b>
Kaga Taxan KP910 NLQ	£379.90 + VAT =	<b>£436.89</b>
Commodore MPS801	£139.90 + VAT =	<b>£160.89</b>

### DAISYWHEEL PRINTERS

Brother HR15 (P)	£315.90 + VAT =	<b>£363.29</b>
Brother HR25	POA	
Brother HR35 + sheet feed	£819.90 + VAT =	<b>£942.89</b>
Daisystep 2000	£219.90 + VAT =	<b>£252.89</b>
Diablo 630	POA	
Silver Reed	POA	
Smith Corona TP1	£179.90 + VAT =	<b>£206.89</b>
Juki 6100	£319.90 + VAT =	<b>£367.89</b>
NEC	POA	
Qume	POA	
Ricoh	POA	
Tec	POA	
Epson DX100	£339.90 + VAT =	<b>£390.89</b>
Commodore DPS1101	£309.90 + VAT =	<b>£356.39</b>

### PRINTER/TYPEWRITERS

Brother EP22	£109.90 + VAT =	<b>£126.39</b>
Brother EP44	£189.90 + VAT =	<b>£218.39</b>
Brother TC600	£373.50 + VAT =	<b>£429.53</b>
Brother FB100 Disk Drive for TC600	£161.50 + VAT =	<b>£185.73</b>
Juki 2200 Daisywheel (P or S)	£259.90 + VAT =	<b>£298.89</b>

All popular interfaces, cables, etc. available from stock.

Custom cables made to order.

Let our experts match your computer to the printer of your choice.

Printers — All models parallel-centronics interface Serial RS232C available at same or slightly higher prices.

Prices correct at copy date. Subject to change without notice due to currency fluctuations etc. E. & O.E.

### MONITORS

Microvitec Colour		
1431 DS STD RES RGB	£169.90 + VAT =	<b>£195.39</b>
1431 DZ STD RES Spectrum	£199.90 + VAT =	<b>£229.89</b>
1451 DS MED RES RGB	£229.90 + VAT =	<b>£264.39</b>
1451 DQ MED RES GL	£229.90 + VAT =	<b>£264.39</b>
1451 APDS MED RES		
RGB/Composite	£289.90 + VAT =	<b>£333.39</b>
1441 DS High RES RGB	£389.90 + VAT =	<b>£448.39</b>
1456 LI MED RES IBM PC	£395.90 + VAT =	<b>£455.29</b>
1456 DA MED RES Apricot	£349.90 + VAT =	<b>£402.39</b>

## CASH & CARRY COMPUTERS

53-59 High Street,  
Croydon, Surrey CR0 10D.

### COMPUTERS

<b>Apricot</b> (monitors extra)		
F1E 256K RAM 1 x 315K		
Disk	£739.90 + VAT =	<b>£850.89</b>
F1 256K RAM 1 x 720K		
Disk	£859.90 + VAT =	<b>£1029.25</b>
PC 256K RAM 2 x 315K		
Disks	£1225.90 + VAT =	<b>£1409.79</b>
PC 256K RAM 2 x 720K		
Disks	£1375.90 + VAT =	<b>£1582.29</b>
Portable 256K RAM 1 x 720K		
Disk	£1395.90 + VAT =	<b>£1605.29</b>
Xi 10 256K RAM 10Mb	£2095.90 + VAT =	<b>£2410.29</b>

**Commodore** (includes Green Screen Monitor)

PC10 IBM Compatible inc		
Free Colour Graphics Card	£1675.00 + VAT =	<b>£1926.25</b>
PC20 IBM Compatible inc		
Free Colour Graphics Card	£2795.00 + VAT =	<b>£3214.25</b>
SX64 Portable	£478.22 + VAT =	<b>£549.95</b>

<b>Sanyo</b> MBC 555 128K RAM 2 x		
160K Disks	£779.90 + VAT =	<b>£896.89</b>
MBC 775 IBM Portable	£1695.90 + VAT =	<b>£1950.29</b>

<b>IBM</b>	Phone	<b>Compaq</b>	Phone
------------	-------	---------------	-------

### SUPERDISKS Prices per box of ten ex VAT

	SSDD 40TR	DSDD 40TR	SS96TP1 80TR	DS96TP1 80TR
BASF 5 1/4"	<b>£10.00</b>	<b>£17.80</b>	<b>£18.50</b>	<b>£21.00</b>
3M 5 1/4"	<b>£13.50</b>	<b>£19.50</b>	<b>£19.90</b>	<b>£23.90</b>
VERBATIM 5 1/4"	<b>£14.50</b>	<b>£18.40</b>	<b>£18.40</b>	<b>£24.50</b>
DYLAN 5 1/4"	<b>£15.90</b>	<b>£23.50</b>	<b>£23.50</b>	<b>£28.50</b>
TDK 5 1/4"	<b>£17.50</b>	<b>£16.90*</b>	—	<b>£32.00</b>
3M/BASF 3 1/2"	<b>£34.90</b>	—	*Exclusive offer	

Add 70p for P&P per order of Disks or Ribbons

### PRINTER RIBBONS (Ex-VAT Prices)

Single prices, deduct 10% for 5+	Epson 80 Series...	£2.80	
Brother HR15 Corr	£2.65	Epson 100 Series...	£3.40
Brother HR15 MS	£4.95	Juki 6100 SS...	£1.80
Brother HR5	£2.70	Juki 6100 MS...	£3.50
Brother EP44	£2.50	Juki 2200...	£3.50
Brother M1009	£3.60	Kaga KP810...	£9.50
Canon PW1080A	£9.50	Mannesman MT80...	£5.90
CBM 801	£6.50	Seikosha GP50...	£6.50
CBM 802/1526	£5.90	Seikosha GP500...	£6.50
CBM DPS1101 MS	£3.50	Seikosha GP700...	£18.50
Daisystep 2000	£3.50	Shinwa CP80...	£5.90

### Mail Order + Export + Trade Hot Line Phone 01-686 6362



Delivery by Securicor (3 day) please add £5.00 + VAT per item.  
Delivery by T.N.T. (overnight) please add £9.50 + VAT per item.

Send off the coupon or order by 'phone quoting your Access, Barclaycard No. 'Phone 01-686 6362. Immediate despatch on receipt of order or cheque clearance.

Or you can Telex your order on: 946240 Attn 19001335

We accept official orders from PLC's, Government Departments and Educational establishments.

These prices correct until superceded by next advertisement.

To: Cash & Carry Computers, 53-59 High Street, Croydon, Surrey CR0 10D.

Please supply

I enclose my cheque for £..... including delivery by Securicor/T.N.T.\*

or charge my Access/Barclaycard No. ....

Name ..... Signature .....

Address .....

\*Please Delete

PC







# TRANSACTION FILE

AND ONE

- **TWO SHUGART SA800** standard mount 8in floppy disk drives, new, £295 the pair. High quality horizontal enclosure/power supply for two SA800R type drives. New (Ex Opus), £75. Tel: 01-451 0520.
- **TI820 KSR** high quality keyboard/dot matrix printer. American voltage (converter available), not working properly, £50. Tel: Bordon (04203) 7194.
- **BBC MODEL B** with Torch Z80 disk pack (2x400k), Z80(64k) second processor, Philips high-res monitor. Full set Perfect business software, discs, manuals, books etc. All equipment little used. Tel: (0385) 62357.
- **APPLE II** monitor, dual disc drives, language card, Z80 card, Pkaso printer card, Saturn 128k disc emulator, 80 column, lots of software, £950 the lot. May split. Tel: (0227) 452061 (Canterbury).
- **BBC MODEL B. OSI.2** with 40/80track switchable single sided Teac disc drive, 16k sideways RAM. Voltmace joystick, lots of software + Wordwise, View, Disc Doctor, Spreadsheet, £550. Tel: 01-993 2572 (West London).
- **APPLE EUROPLUS** software; Wizardry I & II, £15; Applesword, £15; Dos 3.3 toolkit, £15; F.S.1, £5; Wizard and Princess, £5; manuals and books, £5; (take all for £50). Tel: Stamford (Lincs) 56708 (eves).
- **BBC B 1.2 OS**, plus DFS with View wordprocessing chip, double 200k 80 track disk drives, monochrome monitor, Juki 6100 daisywheel printer. Four months old, £995. Tel: Cambridge (0223) 811436 (eves).
- **ATARI SOFTWARE**. Utilities, languages, games. All on disk, no bootlegs. Also books and technical manuals. Approx 35 disks, 8 manuals, all as new. Tel: Ewen on Leicester 358899 for details.
- **PAIR OF SONY 3 1/2in 500k byte** 300 RPM drives for sale. 5 1/4in pin compatible, £155. Will split, £80 each. Tel: (0734) 883220 after 7pm.
- **SHUGART 801** 8in floppy disc drive with OEM and service manuals. Hardly used. £100. Tel: 01-609 8282.
- **TRS-80 Model 4**. Twin 80k discs, 64k RAM, TRS Dos, 6x12in green screen monitor. Excellent condition, £650 ono. Wanted TRS-80 software. Good quality printer. Tel: Swansea 464253 (eves).
- **TANDY MODEL THREE**. Twin disk drives, good condition plus TRS-80 disk system owners manual, TRS-80 Cobol compiler and 10 single sided 5 1/4in disks, £650. Tel: 01-732 5468 after 6pm.
- **TANDY TRS-80 Model 4**, 128k RAM, two drives, RS232C, 40 disks, Multiplan, Superscript, Profile, Visicalc, many programs, games, Dos's manuals + Model 6 line printer. Ideal system for small business, £950. Tel: (0306) 7114808.
- **BBC B OSI.2**, modem (Prdsm Nightingale with Commstar ROM) and 14in Decca colour monitor, cassette recorder, games and new computer desk. Very good condition. Will consider offers, £600. Tel: (0270) 820700.
- **CASIO PB700**. Unused, 1984/5 with manuals, case, Superbasic, memory fully expanded (48k) — three RAM cards, built-in multiline screen: The best pocket computer available without doubt — I own two! Just £125 ono. Tel: 01-527 5493.
- **ICL PCI**, 64k RAM, 5Mbyte fixed disc + 5 1/4in diskette. Kokusai monitor + keyboard, microline 82A printer, MBasic, word processor, database + games. Reasonable offers over £1,000. Tel: (0625) 28404 after 8pm or weekends.
- **MAGAZINES**, back numbers of various computing magazines for sale. Send s.a.e for details. Clarke, 68 Rock Lane, Stoke Gifford, Bristol BS12 6PG.
- **TANDY MODEL I** disk, 64k expansion, monitor, £299 for quick sale. Tel: 01-874 5365.
- **AFFORDABLE RELIABLE PRINTING**: Tandy CGP115 for colour printer/plotter. Surplus to requirements (I've upgraded to Microliner), £100. Tel: (0936) 33300 (near Stoke-on-Trent). Works with BBC — includes leads.
- **GENERAL ELECTRIC TERMINET-30**. 132 column printer terminal, alpha numeric keyboard, integral dual datadrives for print file dumps and offline data preparation. Excellent condition, £250 ono. Tel: (0203) 443377 (Coventry).
- **SHARP MZ-80A**. Built-in green monitor and cassette. Perfect condition. Books, languages, assembler, m/code tools, games etc. Cost over £530, sell for £230 or nearest offer. Tel: (051 733 2449).
- **SYSTIME CENTRONICS** dot matrix printer, working, £100; Burroughs friction/tractor feed dot matrix printer, mechanism new with all accessories and full circuit diagram. Bargain for experimenter, £40. Tel: (0661) 843449.
- **NASCOM 2**. Cased with manuals and info, hardly used, £125; Crofton green screen monitor, £30; Soundmaster hi-res amber monitors, new and unused, £50, S100 64k RAM, £90. Tel: (0661) 843449.
- **DELTADATA SYSTEMS RS232** terminal, many features, good order, £200; DEC Centronics dot matrix printer with stand, £100; DEC RK05J hard disk drives (two), working order, £100 each, Tel: (0661) 843449.
- **FOR SALE**: HP41C Hewlett Packard programmable calculator. With card reader, printer, several ROM modules and all manuals. Tel: (0740) 21375 after 6pm.

## DIARY DATA

*Readers are strongly advised to check details with exhibition organisers before making arrangements, in order to avoid wasted journeys due to cancellations, printer's errors, and so on.*

London	(Barbican), Business Telecom Exbn. Contact: Online Conf's Ltd, (01) 868 4466	21-23 May
London	(Bloomsbury Crest), Microfilm Exbn. Contact: Beta Exbns Ltd, (01) 405 6233	21-23 May
London	(West Hotel), International Videodisk, Optical Disk and CD ROM Conf & Exbn. Contact: Meckler Comm's, (01) 240 0856	24-31 May
London	(Earls Court), Business Computer Show. Contact: Reed Exbns, (01) 643 8040	4-6 June
London	(Kensington Exbn Centre), Computer & Peripherals Equip't Trade Exbn (COMPETA). Contact: Network Events Ltd, (0280) 815226	4-6 June
London	(Barbican), Office Automation Show & Conf. Contact: Cahners Exbns Ltd, (061) 832 4242	4-6 June
London	(Earls Court), Software Show. Contact: Reed Exbns, (01) 643 8040	4-6 June
London	(Novotel), Commodore Computer Show. Contact: Genesis PR Ltd, (01) 935 7777	7-9 June
London	(Olympia), European Unix User Show. Contact: EMAP Int Exbns Ltd, (01) 837 3699	12-14 June
Germany	(Stuttgart), Computing in Clinical Laboratories. Contact: Dr Trendelenburg, (0711) 2034 482	14-16 June

## WRITING FOR PCW

*Your chance to contribute to the magazine.*

We're offering readers a chance to get rich (well, at least richer) and to influence what's published in the magazine — by writing for it. We welcome approaches from would-be writers, including those who have never appeared in print before. It's often users with practical experience who have the most interesting things to

say, so don't worry if your prose is less than perfect, we can take care of the polishing.

If you have an idea for a feature write, with a brief synopsis, outlining the proposed structure and content. If your article is already written, then send it in for consideration. Remember to put your name and address on both the

covering letter and the manuscript — along with a daytime phone number if possible. Manuscripts should be typed or printed out (dot matrix output is fine), in double-line spacing with ample margins top and bottom and on each side.

Any accompanying program listings should be supplied on disk or cassette,



ideally with a printout as well. We'll try to return all submissions sent in with a suitable sae, but make sure you keep a copy of everything you submit as well.

Bear in mind that it's worth taking a look at the Back Issues advertisement to

see what sort of things we have already published — after all there's no point in reinventing the wheel. And please be sure to tell us if you've contacted another magazine (perish the thought): it would be very awkward if the same article appeared elsewhere. Frankly,

we're more likely to accept something which has been offered exclusively to us.

Finally, we do pay for published work — the rate is £65 per 1000 words, and payment usually follows about four-six weeks after publication.

## LEISURE LINES

### Quickie

20 blackbirds are sitting on a fence. The farmer blasts them with his shotgun and kills three. How many live birds will be left on the fence?

### Prize Puzzle

Short and sweet: find three positive numbers in arithmetical progression whose product is 11 (for the uninitiated, arithmetical progression means that

### Brain-teasers from J J Clessa

the difference between successive numbers is constant). And please don't write in to say it can't be done.

Answers, please, on postcards only (letters are automatically disqualified) to PCW Prize Puzzle, June 85 Leisure Lines, 62 Oxford St, London W1A 2HG. Entries to arrive not later than 31 July 1985.

### March Prize Puzzle

What a load of ball-bearings! There was

quite a big response — over 250 entries to the ball-bearing problem, with cards from Iceland, Malta, the United Arab Emirates and the EEC countries.

The puzzle wasn't too difficult to solve by micro: the answer is 19,600 ball-bearings, which is the smallest triangular number that is also a perfect square. The winning entry came from B L Burton of Stoke-on-Trent. Congratulations, your prize is on its way

## NUMBERS COUNT

*Mike Mudge offers a clue to the mystery of the Riemann Hypothesis, and presents the winning solution to the theory of Normal Numbers.*

### The Moebius Function

**Definition.** The function of Moebius  $\mu(a)$  is defined for all positive integers  $a$  by the equalities  $\mu(a) = 0$ , if  $a$  has a squared factor distinct from 1,  $\mu(a) = (-1)^k$ , where  $k$  denotes the number of prime divisors of  $a$ , and  $a$  greater than 1 has no squared factor distinct from 1. In particular, for  $a = 1$  we assume that  $k = 0$  and therefore take  $\mu(1) = 1$ .

$a$	1	2	3	4	5	6	7	8	9	10	11	12
$\mu(a)$	1	-1	-1	0	-1	1	-1	0	0	1	-1	0

**Check:** the sum of the values of  $\mu(a)$  from  $a = 1$  to 100 is 1.

**Alternative definition:**  $\mu(1) = 1$ ,  $\mu(p) = -1$ ,  $\mu(p^n) = 0$  for  $n$  greater than 1,  $\mu(mn) = \mu(m)\mu(n)$  when  $m$  and  $n$  are coprime; that is,  $m$  and  $n$  have no common factor other than 1.  $p$  denotes a prime.

This function is thus very easy to evaluate for isolated numbers whose factors are known, and attention has focused on its use to evaluate more complicated allied functions.

In 1884 J P Gram published  $\mu(n)$  together with the sum:

$$S_n = \sum_{k=1}^n \mu(k)k^{-1}$$

for  $n \leq 300$ ; subsequently Euler's conjecture that as  $n$  tended to infinity  $S_n$  tended to zero was rigorously proved.

The function:

$$M_n = \sum_{k=1}^n \mu(k)$$

has, however, attracted a great deal of attention. In 1897, F Mertens tabulated  $\mu(n)$  and  $M_n$  for  $n \leq 10000$ ; over the period 1897 to 1912, RD von Sternbeck tabulated  $M_n$  for all  $n \leq 150000$ , then in steps of 50 up to 500000, followed by 16 values chosen in the range from 600000 to 5000000. These tables were constructed with the hope of shedding some light on the problem, believed to be still unsolved, of the behaviour of  $M_n$  for sufficiently large  $n$ . This problem is intimately connected with the Riemann hypothesis, whose consequences are to be found throughout classical number theory.

The Moebius function is related to Euler's Totient Function (see PCW, May) thus: if  $\phi(n)$  denotes Euler's Totient Function and

$$\Phi(n) = \sum_{v=1}^n \phi(v),$$

where it is known that  $\Phi(n) = 3n^2/\pi^2 + o(n \log n)$  (order of  $n \log n$ ), then the sum of  $\phi(v)$  is most easily calculated from the formula in Fig 1 where  $[x]$  denotes the largest integer not greater than  $x$  and  $M(x)$  denotes

$$\sum_{v \leq x} \mu(v)$$

that is, the generalisation of  $M_n$  in the

obvious way. JWL Glaisher (1940) published tables of  $\Phi(n)$  for  $n$  going from 1000 to 10000. It is interesting to note that  $E(n) = \Phi(n) - 3n^2/\pi^2$  is positive for all  $n \leq 1000$  except  $n = 820$ .

There are further topics, such as the theory of irreducible cyclotomic polynomials involving the Moebius function, but these are beyond the scope of this article.

**Problem** Tabulate the functions  $\mu(n)$ ,  $S_n$ ,  $M_n$  and possibly  $\Phi(n)$ , the latter to be calculated using the above formula.

Demonstrate the plausibility of the now-proven Euler conjecture referred to above, speculate on the behaviour of  $M_n$ , demonstrate the anomalous sign of  $E(n)$  at  $n = 820$ , and attempt an explanation.

Readers are invited to submit their program listings, output and hardware details together with their conclusions relating to this problem to Mike Mudge, 'Square Acre', Stourbridge Road, Penn, Nr Wolverhampton, Staffs WV4 5NF. (Tel: (0902) 892141). A suitable prize will be awarded to the 'best' entry received by the 1 September 1985. Criteria will include accuracy, originality and efficiency.

Please note that submissions can only be returned if a suitable stamped addressed envelope is included. Ex-

$$2\Phi(n) - 1 = \sum_{v=1}^{\lfloor \sqrt{n} \rfloor} \left\{ \frac{n}{v^2} \mu(v) + M\left(\frac{n}{v}\right)(2v-1) \right\} - M(\sqrt{n})[\sqrt{n}]^2$$

Fig 1



# NUMBERS COUNT

panded reviews of previous problems, together with, subject to the approval of the contributor, copies of detailed programs from the prize winning entry may also be requested.

## Prize-winner December

This topic produced a most interesting and varied response, including Tansoft Forth on an Oric Atmos and 'Homebrew' Forth on an Image 8.

A detailed study of the  $m^{\text{th}}$  root of  $n$  in Z80 code, using the Zeus Assembler on a Spectrum, was particularly interesting. Fortran 77 on a CDC Cyber 180-810

appeared from Sweden, and Z80 code using a two-pass compiler on a ZX81 came from West Germany. A Spectrum, fitted with a 7608 voltage limiter, ran in Basic for 100 hours to duplicate the ENIAC result for  $\pi$ .

This month's winner is Ronald B Shepherd of Cottingham, Humberside, who used Prospero ProPascal version zz 2.1 on a Sharp MZ80B (64k, Z80A, clock frequency 4MHz) with twin 5 $\frac{1}{4}$ in floppy disks and printer. Ronald calculated  $e$  to 5000 digits (2000 in 54 minutes) and  $\pi$  to 2000 digits (6 $\frac{1}{4}$  hours), and having written these to disk

analysed them statistically.

This analysis, including frequency, runs and serial test, was based upon the algorithms of WJ Kennedy and JE Gentle, *Statistical Computing*, 1980. The whole work was extremely well-documented with references, full listings and tabulated output. Suggestions for further work included the gap test and a study of the  $m^{\text{th}}$  root of  $n$  using Newton's Method, together with the digital analysis of Euler's Constant, gamma.

A well-deserved prize is on its way to Humberside.

# MICROCHESS

## Kevin O'Connell watches the moves at the 1984 Dutch Computer Chess Championship.

In the 1984 Dutch Computer Chess Championship, played at the University of Leiden, the victor of 1983, Chess 0.5X, repeated its previous year's feat of winning all its games. Here is the game it won against the program that took second place.

**White: Nona. Black: Chess 0.5X. Bogoljubow Defence**

- |   |        |         |
|---|--------|---------|
| 1 | d2-d4  | Ng8-f6  |
| 2 | c2-c4  | e7-e6   |
| 3 | Ng1-f3 | Bf8-b4+ |
| 4 | Bc1-d2 | Bd4xd2+ |
| 5 | Nb1xd2 | d7-d5   |
| 6 | e2-e3  | 0-0     |
| 7 | Bf1-e2 | Nb8-c6  |
| 8 | 0-0    | Bc8-d7  |
| 9 | a2-a3  | Qd8-e7  |

(Black has a sound but cramped position)

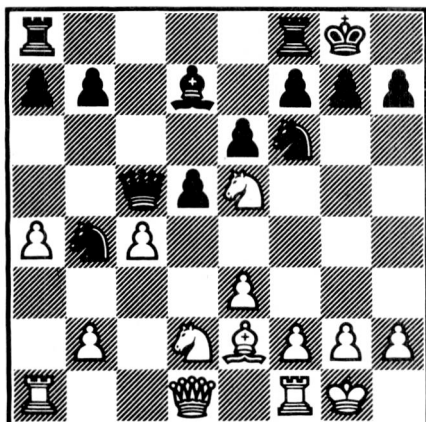
10 a3-a4?

(This is a wasted move which creates a hole on the b4 square which Black should be able to exploit.)

10 ... Nc6-b4

11 Nf3-e5 c7-c5

(This frees Black's game.)



Black's game begins to open up.

- |    |         |        |
|----|---------|--------|
| 12 | d4xc5   | Qe7xc5 |
| 13 | Nd2-e4! |        |

(An interesting idea. If 13 ... Nf6xe4, 14 Ne5xd7 wins material, and if the black queen moves, then 14 Ne4xf6+ shatters Black's pawn defences in front of his king.)

- |    |        |        |
|----|--------|--------|
| 13 | ...    | d5xe4  |
| 14 | Ne5xd7 | Nf6xd7 |
| 15 | Qd1xd7 | b7-b6  |
| 16 | Rf1-d1 |        |

(It seems as though White has done rather well after all, having occupied the open d-file, but the light-squared bishop has very little scope.)

- |    |        |        |
|----|--------|--------|
| 16 | ...    | Nb4-c6 |
| 17 | Kg1-h1 |        |

(This is an irrelevancy, but 17 Qd4-d6 Rf8-d8 18 Qd6xc5 b6xc5 would only highlight the weaknesses created by White's tenth move. 17 Rd1-d6 would be even more disastrous after 17 ... Nc6-e5 18 Qd7-e7 Rf8-c8 and Black wins a rook.)

- |    |        |        |
|----|--------|--------|
| 17 | ...    | Ra8-d8 |
| 18 | Qd7-c7 | f7-f5  |
| 19 | Rd1-d7 | Rd8xd7 |
| 20 | Qc7xd7 | e6-e5  |
| 21 | Ra1-d1 | f5-f4  |

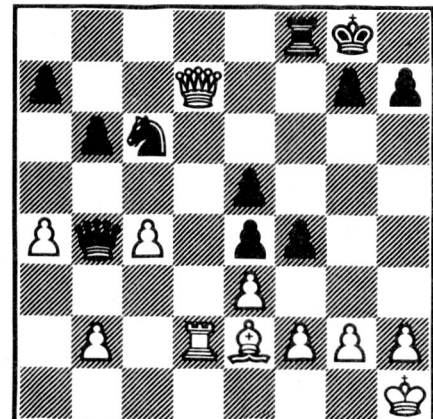
(White still has control of the d-file, but what can she (when first programmed, Nona was named after the then women's world champion, Nona Gaprindashvili) do with it? Meanwhile Black continues aggressively, succeeding in weakening the dark squares near White's king and in giving the rook more scope.)

- |    |        |        |
|----|--------|--------|
| 22 | Rd1-d5 | Qc5-b4 |
| 23 | Rd5-d2 |        |

(Cutting off the black queen's access to e1.)

- |    |     |         |
|----|-----|---------|
| 23 | ... | Nc6-d4! |
|----|-----|---------|

(The white queen's access to a square (d2) is cut off in turn and to very great effect.)



White's position is looking desperate — Black starts the mopping-up operation.

- |    |         |        |
|----|---------|--------|
| 24 | Qd7-d5+ | Kg8-h8 |
| 25 | Rd2-d1  |        |

(There is nothing better.)

- |    |     |        |
|----|-----|--------|
| 25 | ... | Nd4xe2 |
|----|-----|--------|

(Black conducts the mopping-up operation which follows very efficiently.)

- |    |        |         |
|----|--------|---------|
| 26 | a4-a5  | Qb4xb2  |
| 27 | a5xb6  | a7xb6   |
| 28 | g2-g3  | Ne2-c3  |
| 29 | Qd5-d6 | Rf8-g8  |
| 30 | Rd1-d2 | Qb2-b1+ |
| 31 | Kh1-g2 | f4xe3   |
| 32 | f2xe3  | Qb1-e1  |
| 33 | Kg2-h3 | Qe1xe3  |
| 34 | Rd2-b2 | Qe3-f3  |
| 35 | Rb2xb6 | Nc3-d1  |
| 36 | Rb6-b2 |         |

(A forlorn attempt to distract her opponent from mate in two, which was threatened by 36 ... Nd1-f2+ 37 Kh3-h4 Qf3-g4 (or 37 ... g7-g5.)

- |    |     |        |
|----|-----|--------|
| 36 | ... | Nd1-e3 |
|----|-----|--------|

White resigns 0-1

(It is still mate in two (after 37 Qd6-g6 — anything else allows mate in one.)



*Rupert Steele reports on the rumblings in the ACC Council, which now has a new chairman and fresh ideas for the ACC and its responsibilities. He also presents a round-up of the new clubs.*

John Bone of Newcastle Personal Computer Society and Computer-Town! North-East has been elected as the new chairman of the Association of Computer Clubs in a contested election (in which I did not stand) at the recent meeting of the ACC Council, but I shall continue to write this column and to deal with correspondence from clubs arising from it. Other correspondence and telephone enquiries should be directed to John Bone.

At Council, there was considerable interest both in the insurance schemes that the ACC runs on behalf of the affiliated clubs, and the idea of a regional structure for the Association. Some delegates expressed an interest in acting as the ACC regional coordinator in their areas. Andrew Holliman is now in charge of this, and anyone interested should contact him at 5 Trinity Close, Balsham, Cambridge CB1 6DW or phone (0223) 893983. We all regard the establishment of a proper regional structure for the ACC as being important for the computer club movement as a whole.

### Club News

It has become clear that in my concern to introspectively avoid looking only at London and the Home Counties, I have almost entirely ignored the whole area! This month's club news is therefore focused on these areas, starting with Surrey.

I am informed of the Croydon Apple User Group, which claims to have a pool of expertise extending to many fields, and to be anxious to meet new members. The secretary is Roger Laming of 1 Carlton Road, South Croydon, tel: (01) 681 6842.

Nearby is the rather larger Croydon Computer Club, among its activities are two ComputerTown! branches at Central Croydon and Norbury. Vernon Quaintance runs the Norbury branch, which meets from 9.30pm to 12.30pm at Norbury Junior Library, Breatrice Avenue, Norbury each Saturday morning. About 25 children attend each session, whose ages vary from about eight to 18. There is usually a range of micros available, typically the BBC, Apple, Commodore 64, Tandy TRS-80 and Sinclair Spectrum. While much of the introduction to the equipment is through games, there is a continuous Basic programming class. To find out more, just turn up one Saturday

morning and join in.

The West Surrey Computer Club meetings are held on the second Thursday of each month at the Stoke Hotel, Guildford, with a BBC user group also meeting on the third Friday of each month at the Guildford County College of Technology. The meeting for 13 June will be about incompatibility and language differences, so if you can't work out why your program won't run on another micro (and you live near Guildford)—this is the meeting for you. The contacts are John Stokes on (0483) 38947 and Jan Spencer on (0483) 63512, or write to 52 Lindfield Gardens, Guildford GU1 1TS.

Are you near Camberley or Redhill? If so, there are a couple of contact points (I have no detailed information) for computer clubs. To contact the Camberley Computer User Club, ring David Crosby-Clarke on (0344) 771590, or write to him at 55 Robin Lane, Sandhurst, Camberley, Surrey GU17 8AU. In Redhill, contact TM Randall of the Foxbro GB Computer Club. I don't know if it welcomes non-Foxbro members, but if you are interested, write to 6 Copley Close, Redhill RH1 2BE.

In Sutton, A Close has written to me about SPECCY, a register for 48k Spectrum owners with young children. For inclusion on the register and further details about SPECCY, send your child's name, age (one-seven years) and address to A Close, 38 Homedale House, 3 Brunswick Road, Sutton, Surrey SM1 4DG.

In a rather different style, RP Young has written to me about the Dragon Computer Club. The idea is to run a postal club for Dragon users only, with a monthly newsletter and club discounts arranged with equipment suppliers. If you are interested, write to 37 Laburnam Court, Redehall Road, Smallfield, Surrey.

Dennis Frank Tomlin writes about his 'Play for Life' computer club, which is apparently concerned with life-affirming playthings including software and hardware for games. Dennis is on (01) 647 1861, or you can write to him at 78 Boundary Road, Carshalton, Surrey SM5 4AD. There appears to be some kind of social/political message connected with the club, but this is unclear.

Moving on to Sussex, Robert Cooke is secretary of the Eastbourne and District Computer Club. He can be contacted at 22 Selwyn Road, Eastbourne, Sussex

BN21 1LR, and the club meets on the fourth Wednesday of each month at the St Aidan's Methodist Church Hall, Whitley Road, Eastbourne.

In Midhurst, West Sussex, there is the Midhurst and District Club. It meets on the second and last Thursday of each month at 'North Mill', the Grange Centre, Bepton Road, Midhurst, and welcomes members with any level of computing experience, especially those who wish to learn but have never liked to ask. Subscriptions are £3 a year plus a £1 a meeting for over 17s, children £1 a year plus 25p/meeting. For details contact Val Weston at 69 Petersfield Road, Midhurst, West Sussex, tel: Midhurst 3876, or call Robert Armes on Midhurst 3279.

From Sussex writes NL Rees of 12 Hayes Close, Ringmer, Lewes, East Sussex BN8 5HN, who is running a Casio Pocket Computer User Group. The idea is that Casio PC owners will be able to get in touch with each other locally to exchange programs and ideas; this will help correct his impression that there has not been a single program published for the Casio Pocket computer. If you are a Casio owner, why not drop him a line or call him on Ringmer 812475 to see how it's going?

In Hampshire, Kevin Weatherford, on Alton 87478, runs ACES (Alton Computing and Electronics Society). It meets at 7.30pm on the second Wednesday and last Friday of each month at the Alton Community Centre, and is planning to build a micro-mouse. Kevin's address is 'Sheen', Old Odiham Road, Alton, Hants GU34 4BW.

And winning this month's catchy acronym prize is BOGBUG, which is the Borough of Gosport BBC Users' Group. It currently meets on the second and fourth Thursday of each month in members' homes. Contact Graham Dubber at 128 Wych Lane, Gosport, Hants PO13 0TE, or phone (0329) 282221 (evenings).

**END**

*For a mention in this column or to let the ACC know about your club: Rupert Steele, 12 Philbeach Gardens, London SW5 9DY ((01) 370 0601).*

*For any other ACC business or to obtain the address of your local club: John Bone, 2 Claremont Place, Gateshead, Tyne and Wear NE8 1TL ((0632) 770036).*

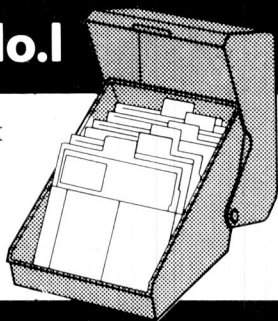


## Disk Storage No.1

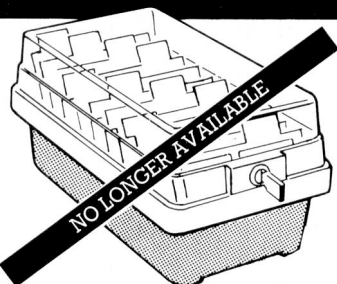
This diskette storage box holds 70 diskettes

Our **Super Low price**  
**£14.95** including VAT

(B)



## Disk Storage No.2



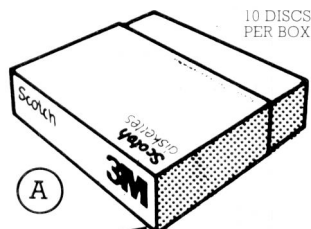
This lockable diskette box holds 90 diskettes

Our **Super Low price**  
**£14.85** inc. VAT

(B)

## 3M Scotch Discs

(Lifetime guarantee)



10 DISCS  
PER BOX

(A)

**ALL PRICES  
INCLUDE VAT**

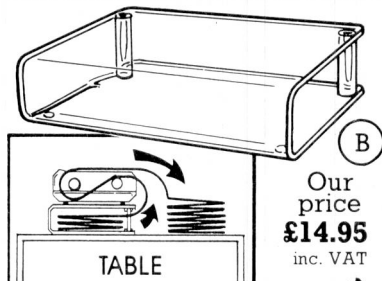
	1-2 boxes	3-9 boxes	10+ boxes
SS 40 TRACK	£15.00	£13.50	£13.00
DS 40 TRACK	£20.00	£18.40	£17.70
SS 80 TRACK	£23.00	£20.70	£20.00
DS 80 TRACK	£26.70	£24.00	£23.00

## 5 1/4" diskettes double density

## Printer Stand

- 80 column dot matrix printers
  - Raises printer high enough to put continuous stationery underneath
  - Beautifully finished in clear perspex
  - Viglen quality every time
  - Will accept paper up to 12 1/2" wide
  - Non-slip rubber pads
- Dimensions:  
15" (380mm) wide  
12 1/2" (320mm) deep  
4" (90mm) high

Also available 136 column printer stand  
**£27.00**



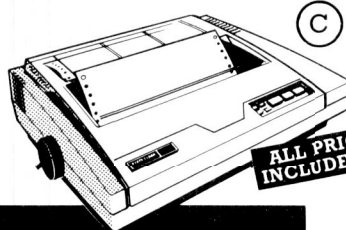
Our  
price  
**£14.95**  
inc. VAT

(B)

**ORDERS**  
are usually  
despatched  
within 24 hours

Viglen are also major suppliers to educational and government establishments and welcome further enquiries and orders.

## Dot Matrix Printers



**ALL PRICES  
INCLUDE VAT**

Canon PW1080A	£297
Epson RX80/FT	£287
Epson FX80	£396
Shinwa CPA80 (100cps)	£227
Mannesmann Tally MT80	£217

## Daisy Wheel Printers



Juki 6100	£347
Quen Data	£247

(C)

# FREE

Parallel Centronics Cables for the following computers. Please specify when ordering.  
BBC, IBM-PC and compatible computers, Apricot, Sirius, Amstrad, MSX.

Printer Interface and Cable for the following printers:-

Apple II	£50
Sinclair Spectrum	£39
Sinclair QL	£25

**ALL PRICES  
INCLUDE VAT**

Please add for carriage:-  
A - £2. B - £3. C - £8.

## SHOWROOM OPEN

Weekdays 9.30 - 6pm  
Saturdays 9.30 - 4pm

### Money-Back Guarantee

If not entirely satisfied with your purchase, simply return to us within 7 days in perfect condition and in original packing including a note stating reason(s) for return.

Post to: Viglen Computer Supplies.  
Unit 7, Trumpers Way, Hanwell W7 2QA.  
Credit Card Holders may order by phone. 01-843 9903.

Please send me \_\_\_\_\_

I enclose Cheque/P.O. for £ \_\_\_\_\_ Incl. carriage.  
Cheques payable to Viglen Computer Supplies.

Name \_\_\_\_\_

Address \_\_\_\_\_

I prefer to pay by ACCESS/BARCLAYCARD  
(Delete whichever is not applicable)

PCW6/85

Card No. \_\_\_\_\_

Signature \_\_\_\_\_

Prices correct at time of printing and offers subject to availability.

Credit Cards valid only if signed by card holder  
Address must be the same as card holder





# MICROMART

## UP TO 35% DISCOUNTS ON SOFTWARE

	Dis- count		Dis- count
RRP Price		RRP Price	
Wordstar .....	295 190	D Base III (1.10) .....	550 325
Wordstar Professional .....	399 265	Info Star .....	295 205
Wordstar 2000 .....	440 299	Multiplan .....	179 145
Supercalc 2 .....	195 145	Sage Accounts .....	375 255
Supercalc 3 .....	295 199	Sage Payroll .....	195 149
Framework (1.10) .....	550 325	Sage Plus .....	695 545
DMS Delta 4 .....	495 375	Sage Options .....	145 105
D Base II (2.43) .....	395 239		

- ★ We will endeavour to better any other advertised price in this issue, please call.
- ★ Please call for anything not listed above.
- ★ All packages are latest versions.
- ★ Please state micro type, operating system and disc format when ordering.
- ★ Please enclose cheque with order where possible including £5 p&p + 15% VAT.
- ★ We supply government, local authorities, plc's, universities etc. on receipt of official orders.
- ★ All prices subject to change at any time.

## CHIT-CHAT

Telex ★ Electronic Mail ★ Prestel ★ On-line Data Bases  
★ Bulletin Boards ★ File Transfer etc.

Sagesoft's brilliant new communications package includes a state of the art communications modem with Auto Dial and Auto Answer facilities as standard (also includes Transformer, RS232 cables etc). The Chit-Chat software is probably the most comprehensive and user-friendly communications program of its type available today.

The system is totally software controlled and includes full Auto Dial and Auto Log-on facilities; simply press a function key and sit back while Chit-Chat does the rest!

For Telex, Electronic Mail, Telemessages etc, Chit-Chat includes a full screen text editor to enable documents to be prepared off-line and subsequently sent down the telephone line at up to 1,200 baud. Incoming messages can be saved to disc and printed out at leisure. In addition to a choice of over 1,800 on-line information systems, Chit-Chat performs superbly on View Data services such as Prestel, Citi Serve etc.

Full colour graphics are supported with the facility to save frames to disc for future reference. Other features include remote access to other micros and file transfer using DDS/X or X modem protocols. Many other advanced features are also available.

Don't get left behind in the communications revolution, buy the Chit-Chat communications package now at just £345 + VAT (or £99 + VAT for Chit-Chat software only) and get a free subscription to Telecom Gold, worth £100, absolutely free! Currently available for Apricot, IBM/compatibles, Wang PC and Sharp 5600 machines (further MS/DOS versions available shortly).

### MICROSTAR SOFTWARE

106 LONDON ROAD  
LEICESTER LE2 0QS

Telephone: (0533) 544601

## PERSONAL COMPUTER SERVICE

Call me:

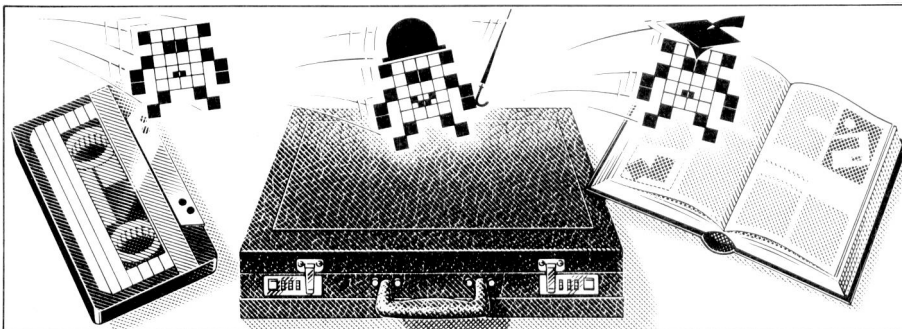
- For unbiased, considered advice on hardware and software before you buy.
- For information on installation and use.
- For a thorough professional programming service.

### ALISTAIR HAMILTON

2 ST PETERS COTTAGE  
MENDHAM, HARLESTON  
NORFOLK, IP20 0NR

Tel: (098682) 447

# PROGRAM FILE



*Nick Walker selects the best of readers' programs — for details on submitting your own, see the end of this section.*

One of the frustrating things about artificial intelligence (AI) is the amount of memory even the most simple AI project consumes; this makes it almost impossible for the home micro owner to do anything useful. The Program of the Month is the best example I've seen of AI on a home micro. Written for the BBC with disk drives, the program recreates the classic experiment popular in the early days of AI on mainframes — a blocks world simulation. Despite its length, the program is an excellent starting point for dabbling with AI, especially natural language understanding.

Commodore 64 owners who also have an interest in electronics and logic circuits will like the logic simulator published this month. Not only does this allow you to enter logic circuits as truth tables, but it also lets you connect the design to the outside world via the user port. This means you could design

a circuit, connect it as you would the real one, and test it making any changes before you put the circuit into hardware.

Other programs include PCW's first program for the Enterprise and two games — Nine Men's Morris for the Spectrum and a very professional version of Yahtzee for the Atari.

We would like to publish programs for the Memotech. If you have written any please send them in for consideration.



Games



Scientific/mathematic



Business



Toolkit/utilities



Educational/Computer Aided Learning



## Program of the Month BBC Alpha

by Mark Needham

BBC Alpha is a version of the artificial intelligence blocks world simulation. By entering commands in natural language, the program will simulate the placing of blocks on a table; questions can then be asked about the arrangement. Although the program is long, it is well-written, easily modified, and a good introduction for those wishing to dabble with AI.

Due to the size of the system, it requires a Level 2 Basic 32k BBC Micro with at least one disk drive. If you have the Chatterbox II voice synthesiser, the conversation will also be spoken. Alpha's intelligence comes from a series of command lists stored as disk files and interpreted in Basic; these are easily customised to create your own vocabulary to talk to Alpha.

### Alpha Running Instructions

The ALPHA system comprises of three programs :-

1 - ALPHA ..... The main run time program, including the command list interpreter, and all BASIC routines.

2 - SETUP ..... The command lists creator. Three command lists are used.

A) COMMAND - The main command list.  
B) NOUN - The noun evaluator list.  
C) IOLIST - The list to handle LOAD/SAVE/CLEAR.  
All lists have comments after them in the listing, these comments need not be typed in.

3 - IMAKER ..... The Table maker creates all the other files needed by ALPHA.



Type in all programs first and save on disk (drive 0). Then run SETUP & TMAKER.

The required files will be saved on the disk.

To run ALPHA type :- CHAIN "ALPHA"

The screen is divided into three main areas.

**Area 1** is for the user input, and consists of four lines at the top of the screen. Full cursor movement is allowed, F0 will clear the whole area, and F8 will insert a space at the cursor location. Press RETURN only after the whole sentence has been typed in.

**Area 2** is the object board. ALPHA handles 15 objects, 6 of which are on the board at the start. 4 of the other 9 are displayed on the right of the screen. It is possible to PUT one of the invisible objects on the screen. For users with black and white TVs only, each block has a character on it, which is the first letter of its colour. E.g. R for red, C for cyan.

**Area 3** is ALPHA's talking area. All responses will be shown here. If the CHATTERBOX II is enabled then ALPHA will speak the words as well as display them. The command list is also displayed here. It can be slowed down by pressing the COPY key. The command list can be disabled by typing :-

DISABLE THE LIST - This speeds up the processing slightly.

## MAIN SENTENCES SYNTAX:-

```
(HELLO) (ALPHA) (,) MY NAME IS unknown
(HELLO) (ALPHA) (,) PLEASE (command)
(HELLO) (ALPHA) (,) (TELL ME) (question)
```

## Adjectives

Red,yellow,green,blue,cyan,magenta,white,round,square,cubic,circular and triangular.

## Names

Cube,circle,triangle. (Square cannot be used as an object name).

## Example nouns

- 1 - THE RED, TRIANGULAR OBJECT
- 2 - AN OBJECT WHICH IS TO THE LEFT OF THE GREEN CUBE
- 3 - A GREEN CUBE WHICH IS NOT UNDER A SQUARE OBJECT WHICH IS THE SAME COLOUR AS THE RED TRIANGLE
- 4 - A RED AND CIRCULAR OBJECT

The first object in a sentence is remembered and is then known as it.

E.g. PUT THE RED CUBE ON THE BOARD  
WHAT IS THE TO LEFT OF IT ? - IT being the RED CUBE

## Command Syntax

```
PUT ( any noun ) ( preposition ) ( any noun ) - Put an object on the board
MOVE ( any noun ) ( preposition ) ( any noun ) - Move an object around
REMOVE ( any noun ) - Remove an object from the board
QUIT (( THE ) GAME )
END (( THE ) GAME ) - e.g. QUIT exits ALPHA
STOP (( THE ) GAME ) - or QUIT THE GAME exits game only
EXIT (( THE ) GAME )
BYE - Exits ALPHA
FIND ( any noun ) - Locate object which is on the board
MAKE ( any noun ) ( adjective ) - Change object's attribute(s)
ENABLE ( THE ) [ TALK / LIST ] - LIST - display of commands
DISABLE ( THE ) [ TALK / LIST ] - TALK - Send words to CHATTERBOX II
PLAY ( THE ) GAME - Start the game
SAVE (( THE ) [ BOARD / GRID ]) - Save the current board positions
LOAD (( THE ) [ BOARD / GRID ]) - Reload the board positions
CLEAR (( THE ) [ BOARD / GRID ]) - Move all objects off the board
```

## Question Syntax

```
WHAT [ COLOUR / SHAPE ] IS ( a noun )
WHAT [ OBJECTS / BLOCKS ] ARE ( THERE ) ( preposition ) ( a noun )
WHAT IS ( THERE ) ( preposition ) ( a noun )
HOW MANY ( adjective ) [ ( name ) / OBJECTS ] ARE (THERE) ( prep ) ( a noun )
IS ( a noun ) ( preposition ) ( a noun )
```

## Definitions

- ( ) - Contents of brackets are optional
- [ ] - Contents hold alternatives, separated by one or more /.
- ( a noun ) - A specific object if ALPHA is to answer the question correctly.  
E.g. IS THERE A RED CUBE TO THE LEFT OF A YELLOW OBJECT ?  
may give the wrong answer if there are more than one yellow object on the board.
- ( any noun ) - Can be any object. The PUT first object in the PUT command must be off the board, the first in the MOVE command must be on the board.
- ( preposition ) - E.g. TO THE LEFT OF, THE SAME COLOUR AS Etc.
- ( adjective ) - E.g. RED, YELLOW, SQUARE, TRIANGULAR Etc
- ( name ) - E.g. CUBE, CIRCLE, or TRIANGLE.

## Example Sentences

```
HELLO ALPHA , MY NAME IS MARK
PLEASE MOVE A RED CUBE ON TOP OF A GREEN CUBE
FIND AN OBJECT WHICH IS THE SAME COLOUR AS THE CIRCULAR OBJECT
IS THE RED OBJECT WHICH IS THE SAME COLOUR AS THE CIRCULAR OBJECT ON TOP OF THE GREEN CUBE ?
```

## data buffers

print buffers T-switches  
buffered protocol converters  
telecommunications buffers

### Formats:

IEEE-488 or Centronics parallel, or V24/RS232c serial, or any conversion combination.

### Buffer sizes:

From 2k to 1 megabyte RAM.

### Computers:

IBM PC, Hewlett-Packard, DEC, Apple, Sirius/Victor, Televideo, Super Brain, Commodore, BBC, Tandy, Sharp, Osborne, NEC, Data-General, etc, etc.

### Applications:

Input buffering (data collection, telecommunications, etc.).

Output buffering (accounts/pay-roll printing, plotting, graphics dumps, assembly listings, word processing, telecommunications, etc).

### Support:

We are the leading specialist distributor of UK-designed buffered interfaces, with a range of products second to none in scope, price and reliability.

**A»Line**  
**Dataspeed Devices Ltd**  
**MICRO BUFFER DISTRIBUTORS**

3 Auburn Road  
Laby  
Leicester LE8 3DR  
☎ 0533 778724

Now you can drive an EPSON printer direct from your 64!

## Comprint for your 64

"Excellent value for money...it beats its rivals on several counts" (Personal Computer News, 12.1.85)

**£61.99**  
incl. VAT  
& carriage

Yes! Comprint/E gives you EPSON printing quality and special printing modes PLUS emulation of Commodore printer features \* Simply plugs into any Epson FX/MX/RX printer \* Links to the 64 or Vic 20 serial-IEEE port with the cable provided \* Why not buy your Epson printer direct from us at the same time?

**A»Line**  
☎ 0533-778724

A-Line Dataspeed Devices Ltd.  
3 Auburn Road  
Laby  
Leicestershire LE8 3DR



## 1541 FLASH!

Do you get bored waiting for your disk drive to load your favourite programs?

Thinking of reverting to 'turbo' tape routines because they're quicker?  
WAIT!!!

From SUPERSOFT comes a great NEW product which you can fit in minutes to upgrade your Commodore 64 and 1541 Disk Drive. All disk operations are speeded up as much as THREE times (for example, programs which normally take a minute to load will load in twenty seconds or less using FLASH!)

1541 FLASH! is 100% compatible with Commodore BASIC. However, if you really want to you can easily revert to the normal slow mode at any time — but we don't think you will!

If you take your programming seriously you can speed DATA transfers by up to 10 times normal speed (in your own programs), and can also make use of 11 screen editing functions, as well as 17 disk commands.

Pressing SHIFT and RUN/STOP becomes the same as LOAD " ", 8.1 so you can start work about five seconds earlier each day!

Supersoft have 1541 FLASH! in stock NOW, so send your cheque for £89.95 or phone 01-861 1166 to order by Access.

P.S. Unlike some add-ons we could mention, 1541 FLASH! leaves you all your memory and the cartridge port available!

### SUPERSOFT

Winchester House, Canning Road, Wealdstone,  
Harrow, HA3 7SU

Tel: 01-861 1166 for further details and our free catalogue

## BASIC COMPILER

For the BBC Micro

Now supports over 100 key words  
Turns Basic programs into really fast  
machine code. It is very easy to use  
and comes complete with full  
instructions. Suitable for the Model  
B or Model A with 32K

CASSETTE £26.95

DISK £28.95

Enquire at your local computer store  
or order direct (Post FREE) from:—

**A.C.K. DATA**

PCW Dept

21 Salcombe Drive

Redhill

Nottingham NG5 8JF

Tel: (0602) 262498

Dealer enquiries welcome

## QL ARCHIVER

WORKS FOR YOU

BUSINESS

SURGERY

LIBRARY

SOCIETY

ENTHUSIAST

DATABASE written in Psion's

ARCHIVE for

invoicing \* mailing \* appointments \* stock  
control

Full User and Technical Documentation

Disk or Cartridge £14.95 + £1 P&P

**Eidersoft**

SINCLAIR QL

SYSTEMS

Tel. 01-478 1291

TELEX. 8951807

PO BOX 54, ILFORD, ESSEX IG1 1BU.

NOUN SYNTAX:—

(A/AN/THE) (name/OBJECT/BLOCK)

(A/AN/THE) (name/OBJECT/BLOCK) preposition group

(A/AN/THE) (adjective/AND/,) (name/OBJECT/BLOCK)

(A/AN/THE) (adjective/AND/,) (name/OBJECT/BLOCK) preposition group

(IT)

### Playing the Game

The game that ALPHA can play is a version of noughts and crosses, but involves getting four of the same shape or colour in a row. To win you must get at least four objects with the same colour in a row, in any direction. For ALPHA to win it must get four similar shapes in a row. To make things fair, only three colours are used in the game, RED, YELLOW, and GREEN.

After each move ALPHA will check the board for winning lines and if someone has won, the game win end.

To start the game type :-

PLAY THE GAME

You move first by typing :-

PUT AN OBJECT ON THE BOARD

ALPHA will then move and tell you what it has done.

The Uums and Errs at the bottom of the screen are there to show that ALPHA has not crashed.

You can stop the game at any time by typing :-

QUIT THE GAME

```

890 REM *****
900 REM * ALPHA *
910 REM * *
920 REM * EXPERIMENT IN A.I. *
930 REM * *
940 REM * BY MARK NEEDHAM *
950 REM * *
960 REM * BBC MICRO 32K OS 1.20 *
970 REM * *
975 REM * LEVEL 2 BASIC *
977 REM * *
980 REM * PLUS 1 DISK DRIVE (0) *
990 REM * *
992 REM * DO NOT RENUMBER *
995 REM *****
997 REM

1000 MODE7:HIMEM=&6000:IN=&7C28:H#="FX229,1":PROCh:OBNUM%=15:CHAT%=0
1010 F1=OPENIN("GETCOM"):CLOSE#F1:IFF1=0THENPRINT"NO FILES !!!":STOP
1020 DIMW$(50),T$(15),N(15),A$(15),N$(15),P$(15),SH$(15):PROCb
1030 FORY1%=1TO4:FORX1%=1TO8:7FNB(X1%,Y1%)=0:NEXT:FORX%=1TOOBNUM%:IFX%<7A#
=STR%X%+"1"ELSEA#="00"
1040 V1%=RND(7):V2%=RND(3):A#=#A#+STR$V1%+STR$V2%+"A"+FNA(V1%,3):GOSUB14400
1070 SH$(X%)=A#:IFX%<7THEN7FNB(FNX(X%,1),FNX(X%,2))=X%
1080 NEXT:S#="RGYBMCW":MNSA=0:L1%=1
1090 SEARCH#="TESTNULLPROCADDNSTR+CF%=INCLDLOADFLAGXXXSUBRXXXXTALKXXXERR#="
1100 PRINTTAB(0,0)CHR$157CHR$129"Artificial Intelligence V1.0"TAB(0,5)STRING$(4
0,"-")
1110 PRINTTAB(0,19)STRING$(40,"-")
1120 PRINTTAB(0,24)STRING$(39,"-"):7F7E7=45:GOSUBB0000:PROCh:PRINT"MY NAME IS
ALPHA""WHAT IS YOUR NAME?":PROCh
1130 PROCh:GAMEZ=0
2000 H#="LOAD GETCOM 7000":PROCh:PROCh:PROCh:PROCh:UNX#="":UN$#="":R2D2=0
2005 H#="LOAD WTAB 6000":PROCh
2010 A=&C00:T#="":Y%=1
2020 B#=#(Y%):FORX%=0TOLENB#-1:A?X%=ASC(MID$(B#,X%+1,1)):NEXT
2030 7F72=0:7F73=&C:7F70=LENB#:CALL7167:B=(7F7A+7F7B*256):IFB=61680PROCh:GOTO2
042
2040 IFB<65535THEN2050
2042 IFUNX=1 ER=7:GOTO6100:ELSET#=#T#+#U001":UN$=#(Y%):UNX=1:GOTO2070
2050 C=&6800+(B-1)*4:FORX%=0TO3:T#=#T#+CHR$(C?X%):NEXTX%
2070 Y%=Y%+1:IFY%<W THEN2020
2100 H#="LOAD PREP 6000":PROCh
2110 B=7F6000:A=&6001
2120 FORY=1TOB:A#=#A
2130 C=INSTR(T#,"W052"+A#):IFC<1THEN2150
2140 T#=#LEFT$(T#,C-1)+"P9"+FNA(Y,2)+MID$(T#,C+LENA#+4):GOTO2130
2150 C=INSTR(T#,A#):IFC<1THEN2190
2160 T#=#LEFT$(T#,C-1)+"P"+FNA(Y,3)+MID$(T#,C+LENA#+4):GOTO2150
2190 A=A+LENA#+1:NEXTY
3000 WP=1:PROCh:CLS:NL=0:CF%=0:ER=0:LCOLD=0:AOLD=0:WRD%=0:OUT#="":R2D2=0
3010 H#="LOAD C.COMMAND 6000":PROCh
3020 H#="LOAD PREP 7000":PROCh
3030 A=&6000:A#=#A:LC=VAL(LEFT$(A#,4)):STACK=0:NAME#="COMMAND"
3100 IFLC=LCOLD A=AOLD:A#=#A:GOTO3104 ELSEA#=#6000
3102 A#=#A:IFVAL(LEFT$(A#,4))<>LC A=A+LENA#+1:GOTO3102
3104 IFNL=-1A=A+LENA#+1:A#=#A:NL=0:LC=VAL(LEFT$(A#,4))
3105 A#=#MID$(A#,5):IFL1XPRINT FNA(LC,4)" - "A#;REPEATUNTIL7FEC<>233
3108 LCOLD=LC:AOLD=A
3110 B#=#LEFT$(A#,4):B=INSTR("EXITSTOPJUMP",B#):IFB>0G#=#B:GOTO5900
3120 B=INSTR(SEARCH#,B#):IFB>1B=5000+INT(B/4)*50:GOTOB
3130 ER=4:GOTO6100
5000 C#=#MID$(A#,5,4):N=INSTR(C#,"?"):IFN<=0N=4 ELSEN=N-1
5010 IFLEFT$(FNW(WP),N)=LEFT$(C#,N)G#=#MID$(A#,9,4)ELSEG#=#MID$(A#,13,4)

```



# PROGRAM FILE

# MICROMART

## BEST UK SOFTWARE PRICES

Buy from TriSoft Ltd., the specialist software company formed by microcomputer consultants.  
 ★ Over 400 leading software packages (inc. Apple)  
 ★ Independent advice in making your choice  
 ★ Professional staff + network of consultants  
 ★ Most formats. All programs latest versions

## SAGE PLUS £495

	List Price	Our Price		List Price	Our Price
Lotus 1-2-3	430	289	Multimate V.3.3	399	265
WordStar 2000	465	299	Smart	635	475
dBase III - 1.1	550	325	Sycero	595	495
Framework - 1.1	550	325	DMS Delta 4	495	375
Open Access	550	325	DR C-compiler	295	225
Supercalc II	195	145	MS Pascal	295	235
Supercalc III	295	199	Pertmaster 1000	650	545
Multiplan	190	145	Hands-on PC-DOS	65	55

## NEW VERSION D BASE II £239

### INTERESTED IN COMPUTER-AIDED DESIGN?

As a result of our consultancy work in micro-based CAD Systems, we are now able to offer the AUTOCAD 2D computer-aided drafting and design system. We firmly believe this to be the best program of its type currently available. Price on application. AUTOCAD is an immensely powerful and versatile software development — please telephone us with respect to required hardware configuration, digitizers and plotters supported etc.

Disks: DYSAN DS/DD £22.50 (box of 10)  
 Sony SS (3.5") £39.95 (box of 10)

## WORDSTAR PROFESSIONAL £399 £265

All prices exclude VAT and carriage.  
 If you see any of these products genuinely advertised at a lower price we will improve upon that offer in most cases. Please phone or write for our comprehensive price list.

DEALER, CONSULTANT, GOVERNMENT AND OVERSEAS ENQUIRIES WELCOME

## TriSoft Ltd

Crown Square, Matlock  
 Derbyshire DE4 3AT  
 Tel: 0629 3021

## 256 COLOURS FOR YOUR BBC MICRO!!

The Colour Expander is probably the most exciting and useful peripheral you could ever get for your BBC Model B. It replaces the eight boring colours on the BBC with a selection of eight from 256. Every colour you could ever want is there: silvery greys, shades of brown, pinks, golds, subtle aquamarines, warm oranges. Everything.

Applications are almost unlimited. The most spectacular computer art is possible, 3D graphics using true shading techniques, fabulous games, business graphics enhancement, education etc.

The Colour Expander is a unique device which will make all the difference to your BBC graphics. It is compatible with most RGB monitors and is extremely easy to use. A software cassette with demonstration and utility programs is included. The Colour Expander costs a mere £85 + (VAT + P&P) = £99.75. Send an SAE for more details if required. The Colour Expander is also available as a module for OEM and scientific use.

### 5 INCH PORTABLE MONITOR

The famous Hiltex portable monitor with 5" monochrome CRT is ideal for computing on the move, portable business computing, home and professional video or any application where a really compact, lightweight, low power monitor is needed. It measures just 180mm x 105mm x 230mm and will run off mains or from batteries in its integral battery compartment. This unique product costs just £92 + (VAT + P&P) = £108.60.

Both of these amazing, unique products are available only from:

**HILTEC ELECTRONICS LTD**

7 Airlie Gardens, Campden Hill Road, London W8 7AJ

Tel: 01-727 5956 or 07987-316

Please allow 28 days for delivery. Mail Order only

```

5020 GOTO5900
5050 T$ (VAL (RIGHT$ (A$, 4))) = "": G$ = "NEXT": GOTO5900
5100 B=VAL (MID$ (A$, 5, 5)): IFB>9999GOSUB B
5110 G$ = "NEXT": GOTO5900
5150 X=VAL (RIGHT$ (A$, 4)): T$ (X) = T$ (X) + P$: G$ = "NEXT": GOTO5900
5200 C=VAL (MID$ (A$, 5, 4)): IFFNW (WP) = "U001" T$ (C) = T$ (C) + UN$ELSET$ (C) = T$ (C) + FNW (WP)
5210 G$ = "NEXT": GOTO5900
5250 CFZ=VAL (RIGHT$ (A$, 4)): G$ = "NEXT": GOTO5900
5300 WP=WP+1: IFWP>W G$ = RIGHT$ (A$, 4): WP=W: WRDZ=1: ELSEG$ = "NEXT"
5310 GOTO5900
5350 GOTO5510
5400 IFER<>0G$ = RIGHT$ (A$, 4) ELSEG$ = "NEXT"
5410 GOTO5900
5500 STACK=STACK+1: W$ (STACK) = LEFT$ (NAME$ + STRING$ (7, " ") + 7) + FNA (LC, 4)
5510 LCOLD=0: AOLD=0: NAME$ = MID$ (A$, 5): H$ = "LOAD C. " + NAME$ + " 6000": PROCH: A=&6000: A
$=A: LC=VAL (LEFT$ (A$, 4)): GOTO3100
5600 A$ = RIGHT$ (A$, 4): IFVALA<>0OUT$ = OUT$ + T$ (9): GOTO5630
5610 GOSUB9900
5630 G$ = "NEXT": GOTO5900
5700 ER=VAL (RIGHT$ (A$, 4)): GOTO5630
5900 NL=0: IFG$ = "STOP" THEN6000
5910 IFG$ = "EXIT" THEN6000
5920 IFG$ = "NEXT" NL=-1: GOTO3100
5930 IFG$ = "JUMP" G$ = MID$ (A$, 5, 4): GOTO5900
5950 LC=VAL (RIGHT$ (G$, 4)): GOTO3100
6000 IFSTACK=0THEN6100
6020 NAME$ = LEFT$ (W$ (STACK), 7): LC=VAL (RIGHT$ (W$ (STACK), 4)): A=&6000: A$ = A: LCOLD=0
: AOLD=0
6030 STACK=STACK-1: H$ = "LOAD C. " + NAME$ + " 6000": PROCH: NL=-1: GOTO3100
6100 PROCF: CLS: IFER=0THEN6200
6110 H$ = "LOAD ERROR 6000": PROCH
6120 A=&6000: CZ=ER: REPEAT: A$ = A: A=LEN A$+1: CZ=CZ-1: UNTILCZ=0
6130 PRINT "ERROR - " A$: GOTO2000
6200 IFR2D2<>0MNSA=R2D2
7000 IFOUT$ = " " OUT$ = "OK"
7005 IFGAMEZ=0ORCFZ=9999THEN7100
7010 FLZ=0: SRCHZ=3: GOSUB19000: IFLZTHEN7510
7020 SRCHZ=4: GOSUB19000: IFLZTHEN7500
7030 TP$ = OUT$: GOSUB19000: IFOUT$ = " " OUT$ = TP$ ELSEOUT$ = TP$ + " " + OUT$
7040 CLS: FLZ=0: SRCHZ=3: GOSUB19000: IFLZTHEN7510
7050 SRCHZ=4: GOSUB19000: IFLZTHEN7500
7100 CLS: A$ = " ": IFCHATZ$ = "LOAD WTAB 6000": PROCH: H$ = "LOAD GETCOM 7000": PROCH: H$ =
"LOAD CHAT 6000": PROCH
7105 XZ=0: YZ=1
7110 IFYZ<>LENOUT$ THEN7200
7120 B$ = MID$ (OUT$, YZ, 1): IFB$<> " " A$ = A$ + B$: YZ=YZ+1: GOTO7110
7130 GOSUB7700: IFLENA$<>XZ<39PRINTA$ " ": XZ=XZ+LENA$+1: ELSEPRINT "A$ " ": XZ=LENA$
+1
7140 YZ=YZ+1: A$ = " ": TIME=0: REPEATUNTILTIME>10: GOTO7110
7200 GOSUB7700: IFA$<> " " ANDLENA$<>XZ<39PRINTA$; ELSEPRINT "A$;
7210 IFCFZ<>9999THEN2000
7220 PROCF: H$ = "F X229, 0": PROCH: STOP
7490 GOTO2000
7500 A$ = "W029": GOTO7520
7510 A$ = "W051"
7520 OUT$ = " ": PROCF: A$ = "W043": PROCF: A$ = "W050": PROCF
7530 GAMEZ=0: GOTO7100
7700 IFCHATZ=0RETURN ELSEA=&C00
7710 FORX1=0TOLENA$-1: A?X1=ASC (MID$ (A$, X1+1, 1)): NEXT
7720 ?&72=0: ?&73=&C: ?&70=LENA$: CALL&7167: B = (?&7A+?&7B*256): IFB>60000RETURN
7730 C=&6800+(B-1)*9: A=&C00: X1=0
7740 B=C?X1: IFB<>0ANDX1<9A?X1=B+128: X1=X1+1: GOTO7740
7750 A?X1=1: A? (X1+1)=0: CALL&722A: RETURN
8000 VDU28, 0, 18, 39, 6: CLS: A=0: FORX=1TO0BNUMZ: A$ = SH$ (X)
8010 CL=144+FNX (X, 3): SX=FNX (X, 1): SY=FNX (X, 2): SH=FNX (X, 4)
8030 CC=ASC (MID$ (S$, CL-144, 1))
8040 IFSX+SY>0THEN8500
8050 IFA=4THEN8540
8060 A=A+1: PRINTTAB (0, 14-A*3): GOTO8505
8500 PRINTTAB (6+(SX-1)*4, 14-SY*3);
8505 ONSH GOTO8510, 8520, 8530
8510 VDUCL, 255, 255, 255, 10, 8, 8, 8, CL, 255, CC, 255: GOTO8540
8520 VDUCL, 254, 255, 253, 10, 8, 8, 8, 8, CL, 239, CC, 191: GOTO8540
8530 VDUCL, 224, 255, 176, 10, 8, 8, 8, 8, CL, 254, CC, 253
8540 NEXTX
8550 FORX=0TO12: PRINTTAB (4, X): VDU151, 255: NEXT: PRINTTAB (0, 0)
8560 RETURN
9000 DEFPROC A
9002 PROCF: CALL&701F: B=IN?159: IN?159=13: A$ = IN: IN?159=B: A$ = A$ + CHR$ B: PROCF: PROCF
9005 IFRIGHT$ (A$, 1) = " " REPEAT: A$ = LEFT$ (A$, LEN A$ - 1): UNTILRIGHT$ (A$, 1) <> " "
9007 IFA$ = " " THEN9002
9010 FORX=1TO50: W$ (X) = " ": NEXT: W=1
9020 FORX=1TOLENA$: B$ = MID$ (A$, X, 1): IFB$<> " " THEN9030
9022 W=W-(W$ (W) <> " "): GOTO9060
9030 IFB$ = " " ORB$ = " " W=W-(W$ (W) <> " "): W$ (W) = B$: W=W+1: GOTO9060
9050 W$ (W) = W$ (W) + B$
9060 NEXTX: IFW$ (W) = " " W=W-1
9070 ENDPROC
9080 DEFPROC P: IFP2>9000TNTZ=1: P2=P2-900: ELSENTZ=0
9085 P1=&7000: REPEAT: S$ = P1: P1=P1+LENX$+1: P2=P2-1: UNTILP2=0: IFNTZ=1X$ = LEFT$ (X$,
1) + "NOT (" + MID$ (X$, 2) + ")"
9090 ENDPROC
9100 DEFPROC B: VDU23, 1, 0; 0; 0; 0: ENDPROC
9110 DEFPROC C: VDU23, 1, 1; 0; 0; 0; 0: ENDPROC
9120 DEFPROC D: PRINTTAB (31, 0) CHR$ 136 "WORKING": ENDPROC
9130 DEFPROC E: PRINTTAB (31, 0) STRING$ (B, " "): ENDPROC
9140 DEFFNA (Z1, Z2) = RIGHT$ (STRING$ (Z2, "0") + STR$ (Z1), Z2)
9150 DEFPROC F: VDU28, 0, 23, 39, 20: ENDPROC
9160 DEFPROC G: VDU28, 0, 24, 39, 0: ENDPROC
9180 DEFPROC Z (X): XZ = (X MOD8) + 1: YZ = (X DIV8) + 1: ENDPROC
9200 DEFFNW (XZ) = MID$ (T$, (XZ-1)*4+1, 4)
9210 DEFFNX (XZ, YZ) = VAL (MID$ (SH$ (XZ), YZ, 1))
9220 DEFFNB (X1, Y1) = &C00 + (Y1-1)*8 + (X1-1)
9230 DEFFNC (Z1) = (?FNB (FNX (Z1, 1), FNX (Z1, 2) + 1) <> 0)
9300 DEFPROC H: H=&C00: H=H$: XZ=0: YZ=&C: CALL&FFF7: ENDPROC
9350 DEFPROC I: H$ = "LOAD WTAB 6000": PROCH
9360 A$ = "W001": OUT$ = " ": PROCF: WRDA$ = OUT$: A$ = "W002": OUT$ = " ": PROCF: WRDTH$ = OUT$:
9370 A$ = "W003": OUT$ = " ": PROCF: WRD1$ = OUT$: A$ = "W003": OUT$ = " ": PROCF: WRD1$ = OUT$: EN
DPROC
9400 DEFPROC J: LOCAL Z1Z: Z1Z=0: X1Z=1: Y1Z=1
9410 Z1Z=?FNB (X1Z, Y1Z): IFZ1Z=0THEN9440
9420 X1Z=X1Z+1: IFX1Z<9THEN9410
9430 X1Z=1: Y1Z=Y1Z+1: IFY1Z<5THEN9410
9440 ENDPROC
9450 DEFPROC J (Z1Z): ?FNB (FNX (Z1Z, 1), FNX (Z1Z, 2)) = 0: SH$ (Z1Z) = "00" + MID$ (SH$ (Z1Z), 3)
: ENDPROC
9460 DEFPROC K (X1Z, Y1Z, Z1Z): ?FNB (X1Z, Y1Z) = Z1Z: SH$ (Z1Z) = STR$ X1Z + STR$ Y1Z + MID$ (SH$ (
Z1Z), 3): ENDPROC
9500 DEFPROC M (M3Z): LOCAL M1Z, M2Z
9510 M1Z=M3Z: IFFNX (M1Z, 2) = 4 THEN9540
9520 M2Z=?FNB (FNX (M1Z, 1), FNX (M1Z, 2) + 1): IFM2Z<>0PROC M (M2Z)
9540 PROC L: PROC L (M1Z): PROCF: K (X1Z, Y1Z, M1Z): ENDPROC
9600 DEFPROC V: B$ = " ": A=&715A: FORX=0TO5: B$ = B$ + CHR$ (A?X EOR15): NEXT: W$ (YZ) = B$: ENDP
ROC

```



# MICROMART



TEL: (0423) 65270

COMPUTER REPAIRS  
AND MAINTENANCE  
82 MEADOWCROFT  
BILTON  
HARROGATE  
N. YORKS.

**c-ran**

YEARS OF EXPERIENCE  
SATISFIED CUSTOMERS WORLDWIDE

**SPECTRUM REPAIRS ALL INCL.  
£18.50**

**WE REPAIR OTHER MAKES TOO!!**

**REPAIRS ARE OUR  
SPECIALITY**  
(FOR THE TRADE AND PUBLIC SECTORS)

ANSWERPHONE BETWEEN 8am-6pm  
LEAVE YOUR NUMBER (WORK & HOME IF POSS.)  
AND WE WILL CALL YOU BACK!!

★ **HELP LINE** ★

FOR A PERSONAL CHAT ABOUT YOUR PROBLEM —  
BETWEEN 7pm-8pm

'GOOD SERVICE COSTS LESS THAN BAD SERVICE'  
A. & P. CALPIN



## LOWEST PRICES IN UK?

MICROS	Prices inc. VAT	FOR YOUR MICRO	
Sinclair Spectrum 48K	£99.95	Sinclair QL Vision Monitor	£279.95
Sinclair Spectrum Plus	£124.95	Microvitec QL Monitor	£269.95
Sinclair QL	£369.95	Commodore Colour Monitor	£199.95
Commodore 64 C (cassette player joystick, Simons basic, programmers reference guide, international soccer and sports bag)	£239.95	Commodore MPS 801 printer	£189.95
Commodore 64 with cassette player	£219.95	Commodore MPS 802 printer (free Easy Script/Future Finance)	£339.95
Amstrad CPC 464 (with colour monitor and over £100 worth software)	£334.95	Commodore DPS 1101 (free Easy Script)	£389.00
Amstrad CPM 464 (with green monitor and over £100 worth software)	£234.95	Epson RX 80 FT+	£265.00
BBC B	£340.00	Shiwa CPA80	£224.95
BBC B (Econet fitted)	£445.00	Brother EP44	£239.00
BBC B + DFS	£445.00	Brother M 1009	£194.95
Casio PB 700	£123.95	Brother HR 5	£149.95
Casio FX 820P	£94.95	Commodore 1541 Disk Drive (free Easy Script)	£194.95
Casio FX 750P	£85.95	Amstrad Disk Drive	£194.95
Psion organiser	£97.95	ZX Expansion system (Microdrive/ interface/software)	£97.95

Complete range of Casio and Spectrum/Commodore add ons at discount prices. Prices/goods subject to availability and change without notice.  
P&P £3.00 (within UK).



Trade and export enquiries welcome.  
**K. K. STATIONERS**



187 Edgware Road    126 Edgware Road    172 Queensway  
Marble Arch    Marble Arch    Queensway  
London W2 1ET    London W2 2D2    London W2  
Tel: 01-723 1436    Tel: 01-402 4592    Tel: 01-229 3247

## OFFSHORE SOFTWARE INC.

**SOFTWARE HOUSES**, do you need  
increased Sales Revenues?

Could you use new software products  
to add to your product range?

If so, let us locate the right PC  
software products and arrange distributor  
agreements for you.

We have offices in both the USA and  
the UK, and we have over 6,000  
products at our fingertips.

Interested?

Write for details:

**OFFSHORE SOFTWARE  
23 STEWART CLOSE  
HAMPTON, MIDDLESEX TW12 3XJ**

# PROGRAM FILE

```

9900 IFA$="RETURN
9905 H$="LOAD WTAB 6000":PROCh
9910 PROCW:H$="LOAD C. "+NAME$+" 6000":PROCh:RETURN
10000 TN=0:RETURN
10100 TN=TN+1:RETURN
10200 N(TN)=1:IFFNW(WP)="W002"N(TN)=2
10210 IFFNW(WP)="W033"N(TN)=3
10220 RETURN
10300 A$(TN)=T$(VAL(RIGHT$(A$,4))):RETURN
10400 N$(TN)=FNN(WP):RETURN
10500 P$(TN)=FNN(WP):RETURN
10600 FORX=1TOOBNUMZ:N(X)=0:A$(X)=""N$(X)=""P$(X)=""NEXTX:RETURN
10910 LIX=1:RETURN
10920 LIX=0:RETURN
11000 Z1=ASC(LEFT$(T$(2),1)):IFRIGHT$(T$(2),1)=CHR$255THEN11025
11005 IFFNX(Z1,2)=4THEN11010
11006 Y1X=?FNB(FNX(Z1,1),FNX(Z1,2)+1):IFY1X<>0PROCm(Y1X)
11010 Z2=ASC(RIGHT$(T$(2),1)):IFFNX(Z1,1)<>0THEN?FNB(FNX(Z1,1),FNX(Z1,2))=0
11020 X2=FNX(Z2,1):Y2=FNX(Z2,2)
11025 X1=1:Y1=1
11030 P2=VAL(MID$(T$(2),3,3)):IFP2>900 ER=1:RETURN
11035 PROCp
11040 IF?FNB(X1,Y1)<>0THEN11100
11050 IFEVAL(MID$(X$,2))=0THEN11100
11060 PROCk(X1,Y1,Z1):GOSUB8000:PROCf:RETURN
11100 X1=X1+1:IFX1<9THEN11040
11110 X1=1:Y1=Y1+1:IFY1<5THEN11040
11120 ER=8:RETURN
11300 M4X=ASC(T$(2)):IFFNX(M4X,2)=4THEN11330
11310 Y1X=?FNB(FNX(M4X,1),FNX(M4X,2)+1)
11320 IFY1X<>0THENPROCm(Y1X)
11330 PROCj(M4X):GOSUB8000:PROCf:RETURN
11500 XZ=ASC(RIGHT$(T$(2),1)):IFLEFT$(T$(2),4)="W018"A$="A"+FNA(FNX(XZ,3),3):GOT
011550
11510 YZ=FNX(XZ,4):A$="A008":IFYZ=2A$="A010"
11520 IFYZ=3A$="A012"
11550 GOSUB9900:RETURN
12000 A$=WRDA$:IFN(1)=2A$=WRDTH$
12010 IFN(1)=3OUT$=OUT$+WRDIT$+WRDIS$:RETURN
12020 OUT$=OUT$+A$:A$=A$(1):GOSUB9900:A$=N$(1):GOSUB9900:OUT$=OUT$+WRDIS$:RETURN
12400 CFZ=0:T$(3)=""T$(4)=""
12405 P2=VAL(MID$(T$(2),2,3)):PROCp
12410 X=ASC(MID$(T$(2),5)):IFX=255X=0
12412 X2=FNX(X,1):Y2=FNX(X,2):C2=FNX(X,3):S2=FNX(X,4):P1=X:X=0
12415 FORZZ=1TOOBNUMZ:IFLEFT$(SH$(ZZ),2)="00"ORZZ=P1 THEN12440
12417 IFT$(3)<>""ANDINSTR(MID$(SH$(ZZ),5),T$(3))<0THEN12440
12418 IFT$(4)<>""ANDVAL(MID$(T$(4),2))>FNX(ZZ,4)THEN12440
12420 X1=FNX(ZZ,1):Y1=FNX(ZZ,2):C1=FNX(ZZ,3):S1=FNX(ZZ,4):IFEVAL(MID$(X$,2))=0TH
EN12440
12430 IFX<>0ANDCFZ=0OUT$=OUT$+" "
12435 X=X+1:IFLIZPRINTSTRX$
12437 IFCFZ=0GOSUB12500
12440 NEXTZZ:IFX=0A$="W055":PROCw
12450 IFCFZ=0THEN12490
12460 OUT$=""IFX=0A$="W040"ELSEA$="V"+FNA(X,3)
12470 PROCw
12490 H$="LOAD C. "+NAME$+" 6000":PROCh:RETURN
12500 IF?6000<>65H$="LOAD WTAB 6000":PROCh
12505 IFLENDUT$200RETURN
12510 CZ=0:A$=MID$(SH$(ZZ),3,2):XZ=1:REPEAT:IFLEFT$(SH$(XZ),2)="00"ORXZ=ZZTHEN12
530
12520 IFMID$(SH$(XZ),3,2)=A$CZ=1
12530 XZ=XZ+1:UNTILCZ=1ORXZ>OBNUMZ:A$=WRDA$:IFCZ=0A$=WRDTH$
12540 OUT$=OUT$+A$:A$="A"+FNA(FNX(XZ,3),3):PROCw
12550 A$="N"+FNA(FNX(XZ,4),3):PROCw
12560 RETURN
12600 DEFPROCw:IF?6000<>65H$="LOAD WTAB 6000":PROCh
12605 C=0:A$=6800:REPEAT:B$=""FORXZ=0TO3:B$=B$+CHR$(A?XZ):NEXTXZ:A=A+4:C=C+1:UN
TILB$=A$
12610 A$=6000:REPEAT:A$=A+A+LENA$+1:C=C-1:UNTILC=0:OUT$=OUT$+A$+" ":ENDPROC
14000 CFZ=1:GOTO12405
14100 GAMEZ=1:GOSUB15900:GOSUB15800:RETURN
14200 GAMEZ=0:RETURN
14300 CHATZ=0:RETURN
14350 F1=OPENIN("CHAT"):CLOSE#F1:IFF1=0RETURN:ELSECHATZ=1:RETURN
14400 IFV2Z=1A$=A$+"A00BA009"
14410 IFV2Z=2A$=A$+"A010A011"
14420 IFV2Z=3A$=A$+"A012"
14430 RETURN
15000 IFGAMEZ=9:RETURN
15005 Z$=ASC(T$(2)):XZ=VAL(RIGHT$(T$(2),3))
15010 IFXZ<B$H$(ZZ)=LEFT$(SH$(ZZ),2)+STR$XZ+MID$(SH$(ZZ),4,1):GOTO15060
15020 IFXZ=0ORXZ=9XZ=1:GOTO15050
15030 IFXZ=10ORXZ=11XZ=2:GOTO15050
15040 XZ=3
15050 SH$(ZZ)=LEFT$(SH$(ZZ),3)+STR$XZ
15060 A$="A"+FNA(VAL(MID$(SH$(ZZ),3,1)),3):V2Z=VAL(RIGHT$(SH$(ZZ),1))
15070 GOSUB14400
15100 SH$(ZZ)=SH$(ZZ)+A$:GOSUB8000:PROCf:RETURN
15500 IFGAMEZ=9:RETURN
15510 ONCFZGOTO15600,15700,15800
15600 F1=OPENOUT("M. BOARD"):IFF1=0RETURN
15610 FORX=1TOOBNUMZ:PRINT#F1,SH$(X):NEXT:CLOSE#F1:RETURN
15700 F1=OPENIN("M. BOARD"):IFF1=0RETURN
15710 FORX=1TOOBNUMZ:INPUT#F1,SH$(X):?FNB(FNX(X,1),FNX(X,2))=X:NEXT:CLOSE#F1:GOS
UB8000:PROCf:RETURN
15800 FORX=1TOOBNUMZ:IFLEFT$(SH$(X),2)<>"00"PROCj(X)
15810 NEXT:GOSUB8000:PROCf:RETURN
15900 FORX=1TOOBNUMZ:V1Z=END(3):SH$(X)=LEFT$(SH$(X),2)+STR$V1Z+MID$(SH$(X),4,1)+
"A"+FNA(V1Z,3)
15910 A$=""V2Z=VAL(MID$(SH$(X),4,1)):GOSUB14400:SH$(X)=SH$(X)+A$:NEXT:RETURN
16000 Z1=ASC(LEFT$(T$(2),1)):Z2=ASC(RIGHT$(T$(2),1)):IFZ2=255Z2=0
16110 P2=VAL(MID$(T$(2),3,3)):PROCp
16120 X1=FNX(Z1,1):Y1=FNX(Z1,2):C1=FNX(Z1,3):S1=FNX(Z1,4)
16130 X2=FNX(Z2,1):Y2=FNX(Z2,2):C2=FNX(Z2,3):S2=FNX(Z2,4)
16140 A$="W038":IFEVAL(MID$(X$,2))=-1A$="W032"
16150 GOSUB9900:RETURN
17000 P$=""Y=TN:IFCFZ=1ANDTN>2THENER=2:GOTO17230
17005 IFN=1ANDN$(1)="N004"ANDCFZ=0P$=CHR$255:GOTO17230
17007 IFN(1)=3P$=CHR$MNSA:GOTO17230
17010 NP$=""
17020 FORX=1TOOBNUMZ:IF(LEFT$(SH$(X),2)="00"ANDCFZ=0)OR(LEFT$(SH$(X),2)<>"00"AND
CFZ=1)THEN17090
17030 IFINSTR("W015W016",N$(Y))>0 THEN17050
17040 IFVAL(RIGHT$(N$(Y),3))<>VAL(MID$(SH$(X),4,1))THEN17190
17050 C=0:IFA$(Y)=""THEN17090
17060 Z=1:REPEAT
17070 IFINSTR(MID$(SH$(X),5),MID$(A$(Y),(Z-1)*4+1,4))<0C=1
17080 Z=Z+1:UNTILC=1ORZ>LEN(A$(Y))/4:IFC THEN17190
17090 IFP$(Y)=""NP$=NP$+CHR$(X):GOTO17190
17120 P2=VAL(RIGHT$(P$(Y),3)):PROCp
17130 X1=FNX(X,1):Y1=FNX(X,2):C1=FNX(X,3):S1=FNX(X,4)
17140 C=0:FORZ=1TOLENP$:Z1=ASC(MID$(P$(Z),1)):IFZ1=X THEN17170
17150 X2=FNX(Z1,1):Y2=FNX(Z1,2):C2=FNX(Z1,3):S2=FNX(Z1,4)

```



# PROGRAM FILE

# MICROMART

```

17160 IFEVAL (MID$(X$,2))C=1
17170 NEXT Z
17180 IFC=INP$=NP$+CHR$X
17190 NEXT X: IFN(Y)=2ANDLENP$>1 THEN R=6: Y=0: GOTD17230
17200 P$=NP$: IFN$=" "ER=2: Y=0: GOTD17230
17210 Y=Y-1: IFY>0 THEN I7010
17220 IFN(1)=1ANDLENP$>1 P$=MID$(P$,RND(LENP$),1)
17230 IFR2D2=0R2D2=ASCP$
17240 RETURN
18000 OUT$="": A$="W029": PROCW: A$="W043": PROCW: FLX=1: RZ=0: BZ=0: NZ=0: OB1$="": SRCHZ=3
18010 GOSUB18500: IFNZ=4 THEN I8060
18020 FLX=1: RZ=0: BZ=0: NZ=0: SRCHZ=4
18030 GOSUB18500
18060 L1X=1
18065 IFLF$$(SH$(L1X),2)="00"AND (FN$(L1X,4)=RZANDSRCHZ=4)OR (FN$(L1X,3)<RZANDSRCHZ=3) THEN A$="C001": GOTD18200
18070 L1X=L1X+1: IFL1X<=0BNUMX THEN I8065
18075 L1X=1
18080 X1X=FN$(L1X,1): Y1X=FN$(L1X,2): IF?FNB(X1X,Y1X)=00RINSTR(OB1$,CHR$X1X)>0 THEN
18100
18085 IFY1X=4 THEN I8095
18090 IF?FNB(X1X,Y1X+1)<00R (X1X=(BZMOD8)+1ANDY1X=BZDIV8) THEN I8100
18095 IF (FN$(L1X,4)=RZANDSRCHZ=4)OR (FN$(L1X,3)<RZANDSRCHZ=3) PROCJ(L1X): A$="C013": GOTD18200
18100 L1X=L1X+1: IFL1X<=0BNUMX THEN I8080
18110 OUT$="": RETURN
18200 PROCW: PROCJ((BZMOD8)+1,(BZDIV8)+1,L1X): ZLX=L1X: GOSUB12500
18210 IF (BZDIV8)+1>1 THEN A$="W011": PROCW: ZLX=?FNB((BZMOD8)+1,(BZDIV8)): GOSUB12500: GOTD18230
18220 A$="W012": PROCW: A$="W002": PROCW: A$="W004": PROCW
18230 GOSUB18000: PROCJ: RETURN
18500 PRINT "Errr": FOR L2X=0 TO 31: PROCJ(L2X): X2X=XZ: Y2X=YZ: IF?FNB(X2X,Y2X)<00R (Y2X>1AND?FNB(X2X,Y2X-1)=0) THEN I8550
18510 PRINT "r": ?FNB(X2X,Y2X)=99
18530 GOSUB19000: IFQX=NZBZ=L2X: NZ=QX: RZ=AZ: OB1$=OB$: PRINT "!":
18540 ?FNB(X2X,Y2X)=0
18550 NEXT L2X: PRINT: RETURN
19000 LZ=0: QZ=0: OB$="": IFFLZ=0PRINT "Umm":
19010 FOR L1X=0 TO 31: PROCJ(L1X): X1X=XZ: Y1X=YZ: IF?FNB(X1X,Y1X)=00R?FNB(X1X,Y1X)=99T
HEN I9030
19020 IFFLZ=0PRINT "m":
19025 ATTRZ=FN$(?FNB(X1X,Y1X),SRCHZ): GOSUB19040
19030 NEXT L1X: IFFLZ=0PRINT
19035 RETURN
19040 MZ=0: FORDX=0 TO 4: X$="": IF (Y1X>1AND (DZ>0ANDDZ<4))OR (DZ=4ANDXZ>5)OR (DZ=0ANDXZ<4) THEN I9110
19050 XDZ=(DZ<2)-(DZ>2): YDZ=-(DZ>0ANDDZ<4): NUMZ=1: XPX=X1X: YPX=Y1X: MZ=0
19060 XPX=XPX+XDZ: YPX=YPX+YDZ: IF XPX>0RXPX<10RYPX>40RYPX<1 THEN I9090
19065 IF?FNB(XPX,YPX)=99MZX=1: GOTD19080
19070 IFFN$(?FNB(XPX,YPX),SRCHZ)<ATTRZ THEN I9090
19080 X$=X$+CHR$(?FNB(XPX,YPX)): NUMZ=NUMZ+1: GOTD19060
19090 IFFLZ=1ANDMZ=1ANDNUMZ>0 THEN QZ=NUMZ: AZ=ATTRZ: OB$=X$
19100 IFNUMZ>4LZ=LZ+1
19110 NEXT DZ: RETURN
>
1000 REM *****
1010 REM * ALPHA *
1020 REM *
1030 REM * EXPERIMENT IN A.I. *
1040 REM *
1050 REM * BY MARK NEEDHAM *
1060 REM *
1070 REM * BBC MICRO 32K OS 1.20 *
1080 REM *
1090 REM * PLUS 1 DISK DRIVE (0) *
1100 REM *
1110 REM * SPECIAL TABLE CREATOR *
1120 REM *****
1130
1140 HIMEM=&6000: A=&6001: B=0: C=&7000
1150 READ A$,B$
1160 IFA$="****" THEN I240
1170 REPEAT
1180 PRINTA$TAB(20)B$
1190 $A=A$: A=A+LENA$+1
1200 $C=B$: C=C+LENB$+1
1210 B=B+1
1220 READ A$,B$
1230 UNTIL A$="****"
1240 ?&6000=B
1250 PRINT"PREPOSITION TABLES CREATED"
1260 *SAVE PREP 6000 6FFF
1270 *SAVE PREP1 7000 7BFF
1280 PRINT"WORDS &6000 - "FNA(A)
1290 PRINT"TOKENS &7000 - "FNA(C)
1300
1310 REM ERROR TABLE CREATOR
1320
1330 A=&6000
1340 READ A$
1350 IF A$="****" THEN 1420
1360 REPEAT
1370 PRINTA$
1380 $A=A$
1390 A=A+LENA$+1
1400 READ A$
1410 UNTIL A$="****"
1420 PRINT"ERROR TABLE CREATED"
1430 *SAVE $.ERROR 6000 6FFF
1440 PRINT"ERRORS &6000 - "FNA(A)
1450
1460 REM CREATE SPECIAL WORDS
1470
1480 A=&6000: B=&6B00
1490 READ A$,B$
1500 IFA$="****" THEN 1610
1510 REPEAT
1520 PRINTA$TAB(20)B$
1530 $A=A$
1540 A=A+LENA$+1
1550 FORXZ=0 TO 3

```

## DISKS

SONY 3 1/2 SS ..... £29.95  
 SONY 3 1/2 DS ..... £39.95  
 DYSAN 5 1/4 DS DD ..... £22.50

Per box of 10. Carriage £1 + VAT  
 Further Discounts for quantities.

Hercules Graphics Cards Mono ..... £375  
 Colour ..... £199

For our software service please see page 235.  
 For all disks, printers and peripherals please  
 telephone.

All prices exclude VAT

**TriSoft Ltd**

CROWN SQUARE, MATLOCK  
 DERBYSHIRE DE4 3AT

Tel: 0629 3021

## THE CRACKER —

★ Find out why this is the best spreadsheet  
 CP/M Z80 PC-DOS  
 CP/M 86 MS-DOS  
 £100 + £2 P&P + VAT

## TRANSLATOR — Z80 to 8086/88

★ Single pass  
 ★ Will handle very large files  
 CP/M Z80 PC-DOS  
 CP/M 86 MS-DOS  
 £80 + VAT

## DISASSEMBLERS — Z80, 8086

★ Disk based  
 ★ Labelling  
 ★ Cross-reference table  
 ★ Data areas ready for re-assembly  
 ★ Will cope with large programs  
 ★ Also 8080/8085 to Z80 opcodes

CP/M Z80 £60 + VAT  
 CP/M 86, PC-DOS, MS-DOS, £80 + VAT

**Software Technology Ltd**

PO BOX 724, BIRMINGHAM B15 3HQ  
 TEL: 021 454 3330

Centronics or RS232  
 serial interfaces for

**SHARP MZ 700**

also

**PRINTERS  
 and  
 MODEMS**

Send for details:

**PETERSON  
 ELECTRONICS LTD**  
 ACADEMY STREET, FORFAR,  
 TAYSIDE DD8 2HA  
 TEL: 0307 62591



## SHARP

We have large stocks of refurbished, as new, Sharp computers and peripherals at reduced prices.

For example:

	Price
MZ3500 including F/DOS .....	£1,100
MZ80A <sup>8</sup> .....	£200
MZ80B <sup>8</sup> .....	£380
P5/P6 Printers .....	£180
Twin Disk Drives from .....	£280

Also interfaces, expansion units, cables, disk Basics. Full system to your requirements. Please phone for quote.

*Above prices are excluding VAT and P&P*

### PERSONAL COMPUTER SERVICES

Unit 14  
Alpha Court  
Windmill Industrial Estate  
Denton  
Manchester M34 3RB  
Tel: 061-320 5011

## WDSoftware

### For the QL

**WD Utilities (3rd ed)** (base £5.50)  
PRINT 60-file Directory or view it on one screen, one-key LOAD, COPY or PRINT 60 files with one key (allows for namesakes). Multiple FORMAtting to prevent corruption by stretching of tape. TOOLkit to give dated, numbered modules in program development. PRUNE old files to release space (one key DELETES a file). Full instructions in QUILL file. Use up to 6 EXTRA MICRODRIVES (add on your Spectrum ones!)

**WD Utilities for CST Disks** (base £8)  
100-file capacity, for CST/Compartamate disk system AND up to 4 extra microdrives. User-friendly timesavers.

**RefQL (2nd ed)** (base £2)  
300 useful QL references in an ARCHIVE file.

### For Spectrum/QL/BBC

**WD Morse Tutor** (base £4)  
From absolute beginner to beyond RYA and Amateur Radio receiving. Adjust pitch. Set speed to your test level (4-18 wpm). Learn from single characters, via groups with wide spaces to random sentences; decrease spacing to normal. Write down what you hear, then CHECK on Screen or Printer (or speech for Spectrum fitted with Currah Microspeech). Also own message, random figures, letters or mixed.

### For Spectrum 48K

**Tradewind** (base £4)  
Sailing/trading strategy game with graphic surprises.

**Jersey Quest** (base £4)  
Text adventure with Bergerac and the Dragon, (not disk).

*Prices: (incl Europe postage, elsewhere add £1). Spectrum/BBC cassettes, base price only. QL or Spectrum Microdrives, £2/cartridge plus base price. 5 1/4" floppies, £2 plus base (SPDOS format for Spectrum).*

Two or more programs on one medium — pay medium plus base EG. WD Utilities and RefQL for £9.50, but IMPOSSIBLE to mix QL/BBC/Spectrum programs on one medium. Send YOUR cartridge and base price, but FORMAT it FIRST in your DRIVE 1 for compatibility.

WDSoftware, Hilltop, St Mary, Jersey.  
Tel: (0534) 81392

## FORTH fortifies the ports other languages cannot reach

**FORTH 83** — Professional FORTHS from Laboratory Microsystems. Screen editor, assembler, utilities, full documentation. Special version for IBM PCs and 100% compatibles. State disc format with order. CPM-Z80 £95 + VAT, CPM-86 MS/PCDOS £110 + VAT, CPM68K £225 + VAT. Cross compilers to generate rommable code also available.

**QL FORTH-83** — screen editor, macro-assembler, decompiler, turnkey compiler, binary overlays, floating point, colour, graphics, sound, QDOS multi-tasker, hashed compiler, new manual, now revised to version 2.0 — £39.95.

**WHITE LIGHTNING** — FORTH plus graphics package. Provides support for up to 255 software sprites with animation. Editor and demonstration included. Spectrum 48 tape — £14.95, microdrive — £19.95. Commodore 64 tape — £19.95, disc — £29.95.

**DRAGON FORTH** — cartridge, split screen editor, sound colour, decompiler, overlays, joystick and timer support, full documentation, and complete source code — £35, CoCo version £45.

**Do-it-yourself FORTH** — installation manual, how to do it, model, definitions, editor — £7.

Source code: 6502, 6800, 6809, 8080, Z80, 8086 8088, 9995, 1802, 68000, Z8000, VAX, Apple II, LSI-II — £8 each.

Implementations for Spectrum to VAX and OS9, and a range of FORTH books. Contact us for all your FORTH requirements.



**MicroProcessor Engineering Ltd**  
21 Hanley Road, Shirley  
Southampton SO1 5AP  
Tel: (0703) 780084



# PROGRAM FILE

```

1560 B?XZ=ASC(MID$(B$,XZ+1,1))
1570 NEXT XZ
1580 B=B+4
1590 READ A$,B$
1600 UNTIL A$="***"
1610 ?A=0
1620 *SAVE $.WTAB 6000 6FFF
1630 PRINT "WORD TABLE CREATED"
1640 PRINT "WORDS &6000 - "FNA(A)
1650 PRINT "TOKENS &6800 - "FNA(B)
1660 GOTO 3060
1670
1680 REM TABLE OF PREPOSITIONS
1690
1700 REM TO THE LEFT OF
1710 DATA "W005W002W007W020",Y(X1<X2)
1720
1730 REM TO THE RIGHT OF
1740 DATA "W005W002W008W020",Y(X1>X2)
1750
1760 REM ON TOP OF
1770 DATA "W012W009W020",Y((X1=X2)AND(Y1=Y2+1))
1780 REM UNDERNEATH
1790 DATA "W013",Y(Y1<Y2)
1800
1810 REM BENEATH
1820 DATA "W014",Y(Y1<Y2)
1830
1840 REM UNDER
1850 DATA "W010",Y(Y1<Y2)
1860
1870 REM THE SAME COLOUR AS
1880 DATA "W002W024W018W025",N(C1=C2)
1890
1900 REM THE SAME SHAPE AS
1910 DATA "W002W024W017W025",N(S1=S2)
1920
1930 REM ON THE LEFT OF
1940 DATA "W012W002W007W020",Y(X1<X2)
1950
1960 REM ON THE RIGHT OF
1970 DATA "W012W002W008W020",Y(X1>X2)
1980
1990 REM OVER
2000 DATA "W011",Y(Y1>Y2)
2010
2020 REM ABOVE
2030 DATA "W026",Y(Y1>Y2)
2040
2050 REM NEXT TO
2060 DATA "W044W005",Y(ABS(Y1-Y2)<2ANDABS(X1-X2)<2)
2070
2080 REM NEAR TO
2090 DATA "W045W005",Y(ABS(Y1-Y2)<2ANDABS(X1-X2)<2)
2100
2110 REM NEAR
2120 DATA "W045",Y(ABS(Y1-Y2)<2ANDABS(X1-X2)<2)
2130
2140 REM CLOSE TO
2150 DATA "W046W005",Y(ABS(Y1-Y2)<2ANDABS(X1-X2)<2)
2160
2170 REM AWAY FROM
2180 DATA "W047W048",Y(ABS(Y1-Y2)>1ORABS(X1-X2)>1)
2190
2200 REM FAR FROM
2210 DATA "W049W048",Y(ABS(Y1-Y2)>1ORABS(X1-X2)>1)
2220
2230 REM ON
2240 DATA "W012",Y(X1=X1)
2250 DATA ***,***
2260
2270 REM TABLE OF ERRORS
2280
2290 DATA Syntax of Sentence
2300 DATA Object Not Found
2310 DATA Out of Words
2320 DATA Unknown Command in Command List
2330 DATA End of Command Line
2340 DATA More Than One Object
2350 DATA Only One Unknown Word Allowed
2360 DATA Impossible
2370 DATA Not in The Game
2380 DATA ***
2390 DATA A,W001,AN,W001,THE,W002,IS,W003
2400 DATA ARE,W004,TO,W005,MANY,W006
2410 DATA LEFT,W007,RIGHT,W008,TOP,W009
2420 DATA UNDER,W010,OVER,W011,ON,W012
2430 DATA UNDERNEATH,W013,BENEATH,W014
2440 DATA OBJECT,W015,OBJECTS,W016,BLOCK,W016,BLOCKS,W016
2450 DATA SHAPE,W017,COLOUR,W018
2460 DATA WHICH,W019,OF,W020
2470 DATA ",",W021,AND,W022,"?",W023,SAME,W024,AS,W025
2480 DATA ABOVE,W026,HELLO,W027,MY,W028,I,W029,NAME,W030,ALPHA,W031
2490 DATA COMPUTER,W031,YES,W032,IT,W033
2500 DATA PLEASE,W034,TELL,W035,ME,W036,BYE,W037
2510 DATA NO,W038,THERE,W039,NONE,W040,LIST,W041,GAME,W042
2520 DATA HAVE,W043,NEXT,W044,NEAR,W045,CLOSE,W046,AWAY,W047,FROM,W048,FAR,W049
2530 DATA WON,W050,YOU,W051,NOT,W052,OK,W053,TALK,W054,NOTHING,W055
2540
2550 REM *** COMMANDS ***
2560
2570 DATA PUT,C001,REMOVE,C002
2580 DATA MOVE,C003,QUIT,C004,END,C005
2590 DATA EXIT,C006,STOP,C007
2600 DATA FIND,C008,MAKE,C009,ENABLE,C010,DISABLE,C011,PLAY,C012
2610 DATA MOVED,C013,SAVE,C014,LOAD,C015,CLEAR,C016
2620
2630 REM *** QUESTIONS ***
2640
2650 DATA HOW,Q001,WHAT,Q002
2660
2670 REM *** NOUNS ***
2680
2690 DATA CUBE,N001,CIRCLE,N002,TRIANGLE,N003
2700 DATA BOARD,N004,GRID,N004
2710 DATA CUBES,N001,CIRCLES,N002,TRIANGLES,N003
2720
2730 REM *** ADJECTIVES ***
2740
2750 DATA RED,A001,GREEN,A002
2760 DATA YELLOW,A003,BLUE,A004,MAGENTA,A005
2770 DATA CYAN,A006,WHITE,A007
2780 DATA SQUARE,A008,CUBIC,A009
2790 DATA CIRCULAR,A010,ROUND,A011

```



# PROGRAM FILE

# MICROMART

```

2800 DATA TRIANGULAR,A012
2810
2820 REM *** VALUES ***
2830
2840 DATA ONE,V001,TWO,V002,THREE,V003,FOUR,V004
2850 DATA FIVE,V005,SIX,V006,SEVEN,V007,EIGHT,V008
2860 DATA NINE,V009,TEN,V010,ELEVEN,V011,TWELVE,V012
2870 DATA THIRTEEN,V013,FOURTEEN,V014,FIFTEEN,V015
2880 DATA SIXTEEN,V016,SEVENTEEN,V017,EIGHTEEN,V018
2890 DATA NINETEEN,V019,TWENTY,V020
2900
2910 REM *** END OF LIST ***
2920
2930 DATA ***,***
2940
2950 REM DECIMAL - HEX CONVERTER
2960
2970 DEFFNA(X)
2980 HEX$=""
2990 FOR Y=3 TO 0 STEP -1
3000 H=X DIV 16^Y
3010 HEX$=HEX$+CHR$(H+48-7*(H>9))
3020 X=X-H*16^Y
3030 NEXT Y
3040 =HEX$
3050
3060 PRINT "CLEARING MEMORY ";:FORX=&7000 TO &7BFF:??X=0:NEXT X:PRINT
3070 OSBYTE=&FFF4:OSWRCH=&FFEE
3080 PRINT "CREATING MACHINE CODE ";
3090 FORXX=&02STEP2:PRINT "PASS "+STR$(XX-(XX=0));
3100 P?=&7000
3110 OPT X?
3120 .POSCUR LDA #31 \ Position cursor
3130 JSR OSWRCH
3140 LDA #72 \ X Position
3150 JSR OSWRCH
3160 LDA #73 \ Y Position
3170 CLC
3180 ADC #1
3190 JSR OSWRCH
3200 RTS
3210 .CLRIN LDY #0 \ Clear input area
3220 LDA #32
3230 .CLOOP STA (&70),Y \ &70 Pointer to Screen
3240 INY \ Location
3250 CPY #160
3260 BNE CLOOP
3270 RTS
3280 .START LDA #&7C \ Start of input routine
3290 STA #71 \ Set up Pointer to Screen
3300 LDA #&2B
3310 STA #70
3320 LDA #0 \ Set up X & Y Positions
3330 STA #72
3340 STA #73
3350 STA #74
3360 JSR POSCUR
3370 .CHARIN LDA #145 \ Wait for key press
3380 LDX #0
3390 JSR OSBYTE
3400 BCS CHARIN
3410 TYA
3420 CMP #128 \ Check less than 128
3430 BCC JP0
3440 CMP #144 \ Check less than 144
3450 BCC MOVCUR
3460 .JP0 CMP #13 \ Return ?
3470 BNE JP1
3480 RTS
3490 .JP1 CMP #127 \ Delete ?
3500 BNE JP2
3510 JMP DEL
3520 .JP2 CMP #32 \ Space Bar ?
3530 BEQ CHAROK
3540 CMP #ASC", "
3550 BEQ CHAROK
3560 CMP #ASC"? "
3570 BEQ CHAROK
3580 CMP #65 \ Check that range is ok
3590 BCC CHARIN
3600 CMP #91 \ 64< char <91
3610 BCC CHAROK
3620 CMP #97 \ 96< char <123
3630 BCC CHARIN
3640 CMP #122
3650 BEQ JP3
3660 BCS CHARIN
3670 .JP3 AND #95 \ Convert lower to upper case
3680 .CHAROK JSR OSWRCH \ Print character if ok
3690 INC #72 \ Move X pos one
3700 LDA #72
3710 CMP #40 \ Check for end of line
3720 BNE JP4
3730 LDA #0 \ Move to next line down
3740 STA #72
3750 INC #73
3760 LDA #73
3770 CMP #4 \ Check for bottom line
3780 BNE JP4
3790 LDA #0
3800 STA #73
3810 .JP4 JSR POSCUR
3820 JMP CHARIN
3830 .MOVCUR CMP #140 \ Check for cursor movement
3840 BEQ LFT
3850 CMP #141
3860 BEQ RGT \ Cursor right
3870 CMP #142
3880 BEQ DWN \ Cursor down
3890 CMP #143
3900 BEQ UP \ Cursor up
3910 CMP #128
3920 BEQ CL \ Clear input area (F0)
3930 CMP #136
3940 BEQ INS \ Insert character (FB)
3950 JMP CHARIN \ Key no good
3960 .UP LDA #73 \ Move cursor up
3970 BEQ UPDATE \ No move if at top
3980 DEC #73
3990 JMP UPDATE
4000 .DWN LDA #73 \ Move cursor down
4010 CMP #3
4020 BEQ UPDATE
4030 INC #73
4040 JMP UPDATE

```

## DISK-OUT DISKS

FROM

**MONAS OVERSEAS UK LTD.**

**UNIT 34, CANNON WORKSHOPS**

**CANNON DRIVE, WEST INDIA DOCK**

**LONDON E14 9SU. Tel: (01) 987 3213**

### PRICES PER 10 DISKETTES\*

5 1/4 in	DYSAN	FUJI	CDC
SS/DD	£15.00	£13.30	£11.90
DS/DD	£21.90	£18.90	£16.30
SS/QUAD	£21.90	£22.90	£17.50
DS/QUAD	£28.10	£22.90	£20.00

\*Other brands also available

Call for LOW PRICES on 3" & 8" disks, cleaning materials & printer ribbons.

3 1/2"	SONY	MAXELL	FUJI
SS/DD	£32.00	£31.50	£31.50
DS/DD	£42.50	£42.00	£41.50

Volume DISCOUNTS available and TRADE enquiries welcome.

**ALL PRICES EX. DELIVERY & VAT**

P & P Rates: 1-5 boxes: 50p per box.

6 + boxes: FREE in UK

(Subject to availability)

## BEST PRICES BEST SERVICE

micros, disk drives,  
printers, monitors

### PRINTERS

Smith Corona TPI	£200
Daisy Step 2000	£245
Oki M82A	£289
Canon PW1080A	£325
Canon PW1156A	£425
Epson RX80	£240
Epson RX80FT	£261
Ricoh 1200N	£499
Brother HR25	£669
Silver Reed EXP400(P)	£246

### MICROS

**Phone us for best deals on:-**  
**COMMODORE PC, ZENITH PC**  
**CANON, OLIVETTI**  
**SANYO, APRICOT**

*All prices include VAT and carriage.*

**TSS SALES**  
**4 Falkland Drive**  
**Kingsteignton**  
**Newton Abbot**  
**TQ12 3RH**

**Telephone:**  
**Newton Abbot (0626) 64544**



# MICROMART

## BRAIN SURGEONS

Anita Electronic Services (London) Ltd. are specialists in the repair and service of the Superbrain and associated peripherals.

We offer a fast on-site nationwide service or alternative repairs can be carried out at our workshops should you wish to bring your machine in to us.

Maintenance contracts are available at very competitive prices.

We also specialise in the repair of Commodore, Apple, IBM Apricot, Osborne and Sirius.

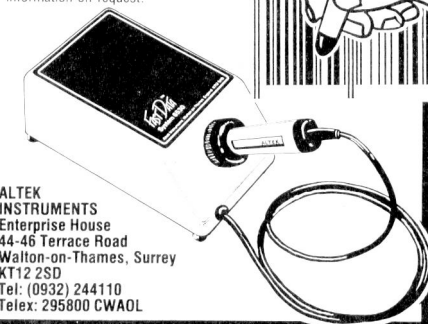
Trade enquiries welcome

For further information telephone or write to:—

**Mr. D. Wilkinson**  
Anita House,  
15 Clerkenwell Close,  
London EC1R 0AD  
Tel: 01-253 2444

## READ & PRINT BAR-CODES USING ANY COMPUTER

Complete identification system including microprocessor controlled scanner hardware plus software to print barcodes on Epson (or similar) dot matrix printer. Most industrial & commercial codes can be read. Packages available for virtually any computer. Our systems are in regular use by many private & public sector organisations worldwide. Prices range from £200-£400. More information on request.



**ALTEK INSTRUMENTS**  
Enterprise House  
44-46 Terrace Road  
Walton-on-Thames, Surrey  
KT12 2SD  
Tel: (0932) 244110  
Telex: 295800 CWAOL

## BLANK CASSETTES

Guaranteed top quality computer/audio cassettes at great budget prices.

**Packed in boxes of 10 with labels, inlay cards and library case.**

Prices include VAT, post and packing.

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| <input type="checkbox"/> (C5) £3.35  | <input type="checkbox"/> (C30) £4.70 |
| <input type="checkbox"/> (C10) £3.40 | <input type="checkbox"/> (C60) £5.30 |
| <input type="checkbox"/> (C12) £3.45 | <input type="checkbox"/> (C90) £7.00 |
| <input type="checkbox"/> (C15) £3.75 |                                      |

### BASF FLOPPY DISKS

Prices of boxes of 10

- |                                                                  |
|------------------------------------------------------------------|
| <input type="checkbox"/> 5 1/4 Single side/Double density £19.95 |
| <input type="checkbox"/> 5 1/4 Double side/Double density £21.85 |
| <input type="checkbox"/> 5 1/4 Double side/Quad density £28.75   |

### MICRO FLEXI DISKS

Price per unit

- |                                                       |
|-------------------------------------------------------|
| <input type="checkbox"/> 3 1/2 Single side £4.00 each |
| <input type="checkbox"/> 3 1/2 Double side £4.75 each |

Indicate quantity of each product required in boxes. Free delivery UK only.

Cheque/PO Enclosed for £

NAME.....

ADDRESS.....

**PROFESSIONAL  
MAGNETICS LTD**

Cassette House, 329 Hunslet Road, Leeds LS10 3YY  
FREEPOST Tel: (0532) 706066

PCW/6/85

# PROGRAM FILE

```

• 4050 .LFT DEC &72 \ Move cursor left
4060 BPL UPDATE
4070 LDA #39
4080 STA &72
4090 LDA &73
4100 BNE UP \ if at start then go back
4110 LDA #3 \ up one line
4120 STA &73
4130 JMP UPDATE
4140 JMP UP
• 4150 .RGT INC &72 \ Move cursor right
4160 LDA &72
4170 CMP #40 \ if at end then go down
4180 BNE UPDATE
4190 LDA #0
4200 STA &72
4210 LDA &73
4220 CMP #3
4230 BNE DWN
4240 LDA #0
4250 STA &73
4260 .UPDATE JSR POSCUR \ Position Cursor
4270 JMP CHARKIN
4280 .CL JSR CLRIN \ Clear input area
4290 JMP START
• 4300 .DEL LDA #0 \ Move all characters to the left
4310 LDX &73 \ including character at cursor
4320 BEQ DEL1
4330 .DELOP CLC
4340 ADC #40
4350 DEX
4360 BNE DELOP
4370 .DEL1 CLC
4380 ADC &72
4390 CMP #0
4400 BEQ UPDATE
4410 TAY
• 4420 .DEL2 LDA (&70),Y
4430 DEY
4440 STA (&70),Y
4450 INY
4460 INY
4470 CPY #160
4480 BNE DEL2
4490 .DELEND LDY #159
4500 LDA #32
4510 STA (&70),Y
4520 JMP LFT
• 4530 .INS LDA #0 \ Move all characters to the right
4540 LDX &73 \ including character at cursor
4550 BEQ INS1
4560 .INSLOP CLC \ The last Character is lost
4570 ADC #40
4580 DEX
4590 BNE INSLOP
4600 .INS1 CLC
4610 ADC &72
4620 CMP #159
4630 BEQ UPDATE
4640 STA &74
4650 LDY #158
4660 .INS2 LDA (&70),Y
4670 INY
4680 STA (&70),Y
4690 DEY
4700 DEY
4710 CPY &74
4720 BNE INS2
4730 LDA (&70),Y
4740 INY
4750 STA (&70),Y
4760 DEY
4770 LDA #32
4780 STA (&70),Y
4790 JMP UPDATE
• 4800 .VER1 LDA &71
4810 TAY
4820 EOR &76
4830 .VERLOP STA (&7F),Y
4840 DEY
4850 BPL VERLOP
4860 LDA &42
4870 LSR 233BB
4880 LSR A
4890 EOR &FE4B,X
4900 STA &7F
4910 BNE VER1
4920 RTS
4930 \ The next routine searches the word table
4940 \ and returns the number of the word.
• 4950 .SRCHWD LDA #0
4960 STA &78
4970 LDA #&600 \ Set pointer to &6000
4980 STA &79
4990 LDA #0
5000 STA &7A
5010 STA &7B
• 5020 .FSTART LDA &78 \ Start of Search loop
5030 STA &74 \ remember current position
5040 LDA &79
5050 STA &75
5060 LDA &7A
5070 CLC \ increment pointer
5080 ADC #1
5090 STA &7A
5100 BCC FJP1
5110 INC &7B
• 5120 .FJP1 LDA #0
5130 STA &71
5140 TAY
5150 .FJP2 LDA (&78),Y \ Get next letter
5160 CMP #13 \ End of word ?
5170 BEQ FJP3
5180 INC &71
5190 JSR INCPTR
5200 CLC
5210 BCC FJP2 \ Jump back
• 5220 .FJP3 LDA &71 \ Compare two words
5230 CMP &70
5240 BNE FJP4
5250 LDA &78
5260 STA &76
5270 LDA &79
5280 STA &77
5290 LDA &74

```



# PROGRAM FILE

# MICROMART



## COMPUTER SYSTEMS AND SUPPLIES

Official Government/Local Authority orders  
welcomed

### COMPUTERS

SANYO and APRICOT, complete systems including WP, spreadsheet, database,  
SAGE accounts, printer, cables, disks & paper from £1395

### MONITORS

Philips CT2000 TV/Monitor £199  
Sanyo CD3125 colour £159  
Microvitec 1451 colour £239

### MATRIX PRINTERS

Shinwa CPA80 100 CPS £179  
Centronics GLP50cps NLQ-NEW £289  
Panasonic KXP100 NLQ £269  
Kaga Taxan KB10 NLQ £289  
Canon 1080A NLQ £285  
Smith Corona D200 NLQ £389  
Paper Tiger 8010 NLQ £325  
NEC Pinwriter £349  
Bother 2024L NLQ (at 96cps) CALL  
IBM printers

### DAISYWHEEL PRINTERS

Uchida Daisystep 18 CPS £209  
Juki 2200 10 CPS £259  
Brother HR15 20 CPS £329  
Juki 6300 40 CPS £779  
NEC Spinwriter 3500 £1039

### PLOTTERS

MCP80-A4 £169  
Roland DXY 101 A3 £295  
Houston EOMP42 A1 £275  
These represent only a small sample of our full range of computers and peripherals.  
Please call for further information.

### PRINTER BUFFERS

8K £75; 16K £85; 32K £95; 64K £119; 128K £249

### EXPANSION SYSTEMS

For IBM, Apricot etc. eg Apricot 128K £139

### FLOPPY DISKS — LOWEST PRICES YET! — POST FREE

Per box of 10 — all double density  
DYSAN 5.25" 3M 5.25"  
100% guaranteed Lifetime guarantee  
SSDD 40 17.00 16.50 16.00 15.50 14.50 14.00 13.50 13.00  
DSDD 40 24.50 24.00 23.50 23.00 18.00 17.50 17.00 16.75  
SSDD 80 24.50 24.00 23.50 23.00 21.00 20.50 20.00 19.50  
DSDD 80 29.50 29.00 28.50 28.00 23.00 22.50 22.00 21.50

NASHUA 5.25" 5 year guarantee Price breakthrough  
SSDD 80 17.45 17.05 16.65 16.25 33.00 32.50 31.50 29.50  
DSDD 80 18.95 18.55 18.15 17.75 44.00 43.50 42.00 39.50

Please add £2.00 to the above prices if required in 'SEE 10' Library Case.

DYSAN branded disks (boxed for other suppliers) — SPECIAL OFFER deduct £1.50 from these prices

PLAIN LABEL DISKS from the above manufacturers EVEN LOWER PRICES.

FANFOLD PAPER Low prices across the range. eg 11" x 8 1/2" — £9.35 11" x 9 1/2" — £9.75 Clean Edge — £11.69

Prices per box of 2000. Quantity discounts. All sizes available.

RIBBONS All types available at low prices. eg Smith-Corona TPI — £2.39 Brother EP44 — £1.89 Juki 6100 — 99p Shinwa CP80 — £3.79 Epson FX-MX-RX — £2.49 Printwheels from £3.79

Please send cheque with order. Carriage Disks POST FREE. Computers/Printers/Monitors/Disk Drives £7.50 Paper £2.25 (fixed) + £1 per box. Ribbons & Printwheels 99p (any quantity). Please add VAT to all prices (inc carriage). Limited space precludes listing of our full range of products. Please telephone if you do not see the item you require.

## A.M.A. COMPUTER SYSTEMS & SUPPLIES

Dept A, 8 Glebe St. Beeston,  
NOTTINGHAM NG9 1B2.  
Tel: 0602 255415

## TYPESET DIRECT FROM DISK

★ Anvil direct typesetting from micro disks puts you firmly in control of your photo-typesetting.

Mark up your text using your usual wordprocessor commands (as long as you are using WordStar, Wordwise or another similar CP/M, MS-DOS or PC-DOS wordprocessing program).

★ TypeFit software copyfits (casts off) your text files on your micro in exactly the same way as a photo-typesetter.

Create copyfitted wordprocessor files which can be typeset line-for-line and character-for-character.

Write or telephone now for details of low-cost TypeFit demo software and FREE Anvil typesetting offer.

## Wordsmiths

19 West End • Street • Somerset  
☎ (0458) 45359





## MONITORS MONITORS MONITORS

Attractively styled plastic case.  
12" green tube widely used  
throughout Europe. 80 character,  
20 Mhz band width phono  
connection.

PRICE  
**£88.00**

(inc VAT + £5 P&P)

Quantity Discounts  
available for trade users

**ELSWICK VIDEO  
ELECTRONICS LTD**

THRELFALLS FACTORY  
HIGH STREET, ELSWICK,  
NR PRESTON, LANC

**Tel: 0995 71146**

## COMMODORE 2001-3000 4000-8000

We have the world's largest selection of software for  
the PET/CBM range. We supply to schools, universi-  
ties, large and small companies, government depart-  
ments, and of course home users.

We also manufacture add-on boards and plug-in chips  
that can make your computer more powerful — the  
most popular add-ons are our high resolution graphics  
boards which give your PET better resolution than an  
Apple!

IF YOU OWN OR USE A PET/CBM COMPUTER WRITE  
OR PHONE FOR A FREE CATALOGUE. By the way, we  
also offer software for the Commodore 64.

## SUPERSOFT

Winchester House, Canning Road, Wealdstone,  
Harrow, Middlesex, HA3 7SJ  
Telephone: 01-861 1166

## BEAVER BASE

*Carefully designed modular application  
systems for micro computers controlled by a  
special software monitor.*

Build in flexibility for step by step imple-  
mentation of any additional tailored business  
elements. Menu driven with password  
security, selective prompts and flexible  
question and answer facilities — improving  
user effectiveness and minimising training  
times. Special attention has been given to  
making the systems easy to use. Detailed  
documentation helps set up and mainte-  
nance of systems data bases. Controlled  
access to CP/M or MS-DOS host programs  
(minimum system requirements for one  
element — two single sided floppies).

Price from **£350** + VAT

Details, please contact:

**LARRY KIRKWOOD**

117 Waller Road, London SE14 5LB

**Tel: 01-732 2944**

# PROGRAM FILE

```
6550 DATA 55172409,40061133,162042
6560 DATA 0711202862,331255202862
6570 DATA 094520,16224033,552040
6580 DATA 455333,424560
6590 REM *** QUESTIONS
6600 DATA 572648,462317
6610
6620 REM *** NAMES
6630
6640 DATA 08252263
6650 DATA 55524262,17390626443662
6660 DATA 28232333,36391233
6670 DATA 0849222855,5552426255
6680 DATA 1739062644366255
6690
6700 REM *** ADJECTIVES
6710
6720 DATA 140733,36391911,49074553
6730 DATA 286231,16263607111726
6740 DATA 55062611,480617,55084647
6750 DATA 4231631208,555242496259
6760 DATA 39324433,173906264436496259
6770 DATA 462411,5531,183919,402323
6780 DATA 400635,55124255,5507350711
6790 DATA 2017,110611,13070711
6800 DATA 196207350711,1348076235
6810 DATA 2952131911,4058131911
6820 DATA 401240131911,55124255131911
6830 DATA 5507350711131911,20171911
6840 DATA 110611171911,134607111319
6850 DATA **
6860
6870 REM SAVE"TMAKER"
```

```
1000 REM *****
1010 REM * ALPHA *
1020 REM * *
1030 REM * EXPERIMENT IN A.I. *
1040 REM * *
1050 REM * BY MARK NEEDHAM *
1060 REM * *
1070 REM * BBC MICRO 32K OS 1.20 *
1080 REM * *
1090 REM * PLUS 1 DISK DRIVE (0) *
1100 REM * *
1110 REM * COMMAND LIST CREATOR *
1120 REM *****
1130
1140 MODE7:HIMEM=&6000
1150 PRINT"CREATING COMMAND LIST";:GOSUB1230
1160 *SAVE C.COMMAND 6000 6FFF
1170 PRINT"CREATING NOUN LIST";:GOSUB1230
1180 *SAVE C.NOUN 6000 6FFF
1190 PRINT"CREATING UTILITY LIST";:GOSUB1230
1200 *SAVE C.IOLIST 6000 6FFF
1210 END
1220
1230 A=&6000:READ A$
1240 IF A$="****" THEN 1350
1250 REPEAT
1260 IF LENA$>25 THEN A$=LEFT$(A$,25)
1270 REPEAT
1280 B=INSTR(A$," ")
1290 IF B>0 THEN A$=LEFT$(A$,B-1)+MID$(A$,B+1)
1300 UNTIL B<=0
1310 A$=A$
1320 A=A+LENA$+1
1330 READ A$
1340 UNTIL A$="****"
1350 PRINT"LIST CREATED"
1360 PRINT"SIZE : &6000 - &"+FNA(A)
1370 IF A>&6FFF THEN PRINT"WARNING DATA LOST - USE TWO FILES"
1380 RETURN
1390 DEFFNA(X)
1400 HEX$=""
1410 FOR Y=3 TO 0 STEP -1
1420 H=X DIV 16^Y
1430 HEX$=HEX$+CHR$(H+48-7*(H>9))
1440 X=X-H*16^Y
1450 NEXT Y
1460 =HEX$
1470 REM *****
1480 REM THE MAIN COMMAND LIST. (COMMAND)
1490 REM *****
1500 DATA 0010 TEST W027 NEXT 0150 ' Hello
1510 DATA 0020 INCW 0100
1520 DATA 0030 TEST W031 NEXT 0050 ' Alpha / Computer
1530 DATA 0040 INCW 0100
1540 DATA 0050 TEST W021 NEXT 0070 ' Test for a comma
1550 DATA 0060 INCW 0800
1560 DATA 0070 JUMP 0200
1570 DATA 0100 TALK W027 ' Say "Hello"
1580 DATA 0110 TALK 0009 ' Say Users Name
1590 DATA 0120 EXIT
1600 DATA 0130 TALK W032 ' Say "Yes"
1610 DATA 0140 EXIT
1620 DATA 0150 TEST W031 NEXT 0200 ' Alpha / Computer
1630 DATA 0160 INCW 0130
1640 DATA 0170 TEST W021 NEXT 0200 ' Test for a comma
1650 DATA 0180 INCW 0800
1660 DATA 0200 TEST U???? NEXT 0205 ' Test for an Unknown word
1670 DATA 0201 INCW 0260 ' If nothing after it
1680 DATA 0202 JUMP 0900 ' must be users name
1690 DATA 0205 TEST W028 NEXT 0300 ' My
1700 DATA 0210 INCW 0800
1710 DATA 0220 TEST W030 NEXT 0900 ' Name
1720 DATA 0230 INCW 0800
1730 DATA 0240 TEST W003 NEXT 0900 ' Is
1740 DATA 0250 INCW 0800
1750 DATA 0255 TEST U???? NEXT 0900 ' Check for Unknown word
1760 DATA 0260 NULL 0009
1770 DATA 0270 STR+ 0009 ' Store name in I$(9)
1780 DATA 0280 JUMP 0100 ' Say "Hello"
1790 DATA 0300 TEST W034 NEXT 0320 ' Please
1800 DATA 0310 INCW 0800
1810 DATA 0320 TEST C??? 1000 NEXT ' Check for any command
```



# PROGRAM FILE

```

1820 DATA 0325 TEST W037 1000 NEXT
1830 DATA 0330 TEST W035 NEXT 0370
1840 DATA 0340 INCW 0800
1850 DATA 0350 TEST W036 NEXT 0380
1860 DATA 0360 INCW 0800
1870 DATA 0370 TEST Q??? 5000 NEXT
1880 DATA 0380 TEST W003 5000 NEXT
1890 DATA 0390 ERR= 0001
1900 DATA 0400 STOP
1910 DATA 0800 ERR= 0003
1920 DATA 0810 STOP
1930 DATA 0900 ERR= 0001
1940 DATA 0910 STOP
1950 DATA 1000 TEST C001 1200 NEXT
1960 DATA 1010 TEST C002 1400 NEXT
1970 DATA 1020 TEST C003 1240 NEXT
1980 DATA 1030 TEST C004 1900 NEXT
1990 DATA 1040 TEST C005 1900 NEXT
2000 DATA 1050 TEST C006 1900 NEXT
2010 DATA 1060 TEST C007 1900 NEXT
2020 DATA 1070 TEST W037 1960 NEXT
2030 DATA 1080 TEST C008 1600 NEXT
2040 DATA 1090 TEST C009 1700 NEXT
2050 DATA 1100 TEST C010 1800 NEXT
2060 DATA 1110 TEST C011 1850 NEXT
2070 DATA 1120 TEST C012 2000 NEXT
2080 DATA 1130 TEST C014 7000 NEXT
2090 DATA 1140 TEST C015 7000 NEXT
2100 DATA 1150 TEST C016 7000 NEXT
2110 DATA 1180 ERR=0
2120 DATA 1190 STOP
2130 DATA 1200 INCW 0800
2140 DATA 1210 NULL 0002
2150 DATA 1220 CF%= 0001
2160 DATA 1230 JUMP 1260
2170 DATA 1240 NULL 0002
2180 DATA 1250 INCW 0800
2190 DATA 1260 SUBR NOUN
2200 DATA 1270 FLAG STOP
2210 DATA 1280 ADDN 0002
2220 DATA 1290 CF%= 0000
2230 DATA 1300 TEST P??? NEXT 0900
2240 DATA 1310 STR+ 0002
2250 DATA 1320 INCW 0800
2260 DATA 1330 SUBR NOUN
2270 DATA 1340 FLAG STOP
2280 DATA 1350 ADDN 0002
2290 DATA 1360 PROC 11000
2300 DATA 1370 EXIT
2310 DATA 1400 INCW 0800
2320 DATA 1410 NULL 0002
2330 DATA 1420 SUBR NOUN
2340 DATA 1430 FLAG STOP
2350 DATA 1440 ADDN 0002
2360 DATA 1450 PROC 11300
2370 DATA 1460 EXIT
2380 DATA 1600 INCW 0800
2390 DATA 1610 SUBR NOUN
2400 DATA 1620 FLAG STOP
2410 DATA 1630 EXIT
2420 DATA 1700 INCW 0800
2430 DATA 1710 NULL 0002
2440 DATA 1720 SUBR NOUN
2450 DATA 1730 FLAG STOP
2460 DATA 1730 ADDN 0002
2470 DATA 1750 TEST A??? NEXT 0900
2480 DATA 1760 STR+ 0002
2490 DATA 1770 PROC 15000
2500 DATA 1780 EXIT
2510 DATA 1800 INCW 0800
2520 DATA 1810 TEST W002 NEXT 1820
2530 DATA 1815 INCW 0800
2540 DATA 1820 TEST W041 NEXT 1835
2550 DATA 1825 PROC 10910
2560 DATA 1830 EXIT
2570 DATA 1835 TEST W054 NEXT 0900
2580 DATA 1836 PROC 14350
2590 DATA 1837 EXIT
2600 DATA 1850 INCW 0800
2610 DATA 1860 TEST W002 NEXT 1870
2620 DATA 1865 INCW 0800
2630 DATA 1870 TEST W041 NEXT 1885
2640 DATA 1875 PROC 10920
2650 DATA 1880 EXIT
2660 DATA 1885 TEST W054 NEXT 0900
2670 DATA 1887 PROC 14300
2680 DATA 1888 EXIT
2690 DATA 1900 INCW 1960
2700 DATA 1910 TEST W002 NEXT 1920
2710 DATA 1915 INCW 0800
2720 DATA 1920 TEST W042 NEXT 1930
2730 DATA 1925 PROC 14200
2740 DATA 1927 EXIT
2750 DATA 1930 TEST W031 NEXT 0800
2760 DATA 1960 CF%= 9999
2770 DATA 1970 TALK W037
2780 DATA 1975 TALK 0900
2790 DATA 1980 EXIT
2800 DATA 2000 INCW 0800
2810 DATA 2010 TEST W002 NEXT 2020
2820 DATA 2015 INCW 0800
2830 DATA 2020 TEST W042 NEXT 0900
2840 DATA 2030 PROC 14100
2850 DATA 2040 EXIT
2860 DATA 5000 TEST 0001 5200 NEXT
2870 DATA 5010 TEST 0002 5400 NEXT
2880 DATA 5020 TEST W003 6000 NEXT
2890 DATA 5090 STOP
2900 DATA 5200 INCW 0800
2910 DATA 5205 TEST W006 NEXT 0900
2920 DATA 5210 INCW 0800
2930 DATA 5215 NULL 0002
2940 DATA 5220 NULL 0003
2950 DATA 5225 NULL 0004
2960 DATA 5230 TEST A??? NEXT 5245
2970 DATA 5235 STR+ 0003
2980 DATA 5240 INCW 0800
2990 DATA 5245 TEST N??? NEXT 5265
3000 DATA 5250 STR+ 0004
3010 DATA 5255 INCW 0800
3020 DATA 5260 JUMP 5285
3030 DATA 5265 TEST W015 5280 NEXT
3040 DATA 5270 TEST W016 5280 NEXT
3050 DATA 5275 JUMP 0900

```

```

or Bye - and jump to process command
Tell
Me
Test for any question
or Is - and jump to process question
Syntax Error
Out of Words
Syntax Error
Put
Remove
Move
Quit
End
Exit
Stop
Bye
Find
Make
Enable
Disable
Play
Save
Load
Clear

These are the commands
that Alpha Understands

Process Put Sentence
Clear T$(2)

Entry Point for Move command

Process Noun Subroutine

Store Noun number in T$(2)

Test for any preposition
Add it to T$(2)

Get second Noun

Store Noun number in T$(2)
Perform BASIC Put / Move

Process Remove Command

Get Noun

Add Noun to T$(2)
Remove object in BASIC

Perform Find
Get Noun
Object is now Known as 'IT'

Make Command

Get Noun

Find any Adjective
and add it to T$(2)
Perform in BASIC

Enable List

Disable the List

End / Stop / Quit / Exit
Check for THE

Check for GAME
Stop the Game

Bye - Bye
Say BYE
Say Users name

Play Command

Start the game in BASIC

How
What
Is question

How question
Many

Clear out T$(2..4)

Check for an Adjective
and add it to T$(3)

Check for a Name
and add it to T$(4)

Check for OBJECT or BLOCK

```

# MICROMART

The KEY to  
FILEHANDLING  
with

# C

MICROSOFT-C LATTICE-C

WHITESMITHS-C DESMET-C

## MULTIKEY

Ready to use library & routines.  
Uses B-tree indexing. £170 + VAT  
Version for BASIC users £90 + VAT  
Phone for fact sheet. Tel: (0786) 85697

CAIRN ASSOCIATES LTD, THORNHILL, STIRLING FK8 3PL

# CAIRN



## QL

**FILE MANAGER:** Shows a combined, sorted and colour coded directory of any one or two drives. Simplified load, save, copy, delete, format and inspect. Powerful wild cards permit editing of categories of file name in one instruction, e.g. copy all files earlier than given date, appending "-bak" to the name.

**FONT EDITOR:** QL windows have 2 fonts. Either can be edited, changed in scope (e.g. chars below code 31), and saved. Includes new Super Basic command to switch fonts. Rapid and simple editing, display full font + user specified text.

**FREE OFFER!** Graphics effects demo, 30 minutes long, included with every purchase! Treasury of effects!

Either program **£10** inclusive  
both **£16** inclusive

Graphics Demo available separate £5

Large SAE for details from:—

**SALTIGRADE SOFTWARE**  
31 ROYAL TERRACE, EDINBURGH EH7 5AH

## Work on your own where you're not alone

A place where you can set up alone or start a business or open a branch office and not have to worry about who answers the phone when you're out.

And the location gives swift access to M4/M3 motorways, the North Circular, the Underground, British Rail and Heathrow Airport in a leafy environment with the Thames nearby.

It's London without the hassle.

**UNITS FROM 100 SQ. FT. AT £50 pw. INCLUSIVE**  
Call in, phone or write: **Barley Mow Workspace, 10 Barley Mow Passage, Chiswick, London W4 4PH. Telephone 01-994 6477.**





# MICROMART

## BEST PRICES SOFTWARE UP TO 40% DISCOUNT

Any packages for most machines  
State machine and operating system

### MICROS

APRICOT F1 ..... from £695  
APRICOT PC, twin disks ..... from £1,250  
APRICOT Xi, 10Mb Winchester  
from £2,100

When ordering, please add 15% VAT to  
payment

### AC COMPUTERS LTD

4A Hearsall Lane  
Coventry

Tel: Coventry (0203) 715102

## FLOPPIES

### Superb "Own-Label" Disks

Five year Warranty — 48 hour Delivery

5 1/4" Disks per 100  
SSDD (40 tr) ..... £95  
DSDD (40 tr) ..... £105  
DSQD (80 tr) ..... £148

Boxes of 25, minimum order 50

3 1/2" Disks per 10  
Single Sided ..... £28.75  
Double Sided ..... £36.75

Boxes of 10, minimum order 20

All prices ex-VAT but include delivery  
(UK). ACCESS-VISA-COD or 3% Cash  
with order discount. Send cheque to:

### MID-SURREY MEDIA

4th Floor

182-194 Union Street

London SE1 0LH

Tel: 01-928 8434

## THE NAG PC50 LIBRARY



The PC50 Library is a subset of the  
internationally renowned NAG library and  
offers a powerful set of programming tools  
for the Fortran user.

Available for ACT apricot, SIRIUS 1  
/Victor, IBM PC, CP/M version for  
8-bit micros.



For full details write to:—

**HARRISON-WARD  
associates Ltd.**

62 LYNTON ROAD, RAYNERS LANE  
HARROW, MIDDLESEX HA2 9NN  
UXBRIDGE (0895) 54052

# PROGRAM FILE

```

3060 DATA 5280 INCW 0000
3070 DATA 5285 TEST W004 NEXT 0900 ' Are
3080 DATA 5290 INCW 0000
3090 DATA 5295 TEST W039 NEXT 5298 ' There
3100 DATA 5296 INCW 0000
3110 DATA 5298 TEST P??? NEXT 0900 ' Check for any Preposition
3120 DATA 5300 STR+ 0002
3130 DATA 5305 INCW 0000
3140 DATA 5310 SUBR NOUN ' Get Noun
3150 DATA 5315 FLAG STOP
3160 DATA 5320 ADDN 0002 ' and add it to T$(2)
3170 DATA 5325 PROC 14000 ' Perform Count in BASIC
3180 DATA 5330 EXIT
3190 DATA 5400 INCW 0000 ' Perform What Command
3200 DATA 5410 NULL 0002
3210 DATA 5420 TEST W018 NEXT 5460 ' Check for COLOUR
3220 DATA 5430 STR+ 0002
3230 DATA 5440 INCW 0000
3240 DATA 5450 JUMP 5490
3250 DATA 5460 TEST W017 NEXT 5700 ' Check for SHAPE
3260 DATA 5470 STR+ 0002
3270 DATA 5480 INCW 0000
3280 DATA 5490 TEST W003 NEXT 0900 ' Check for IS
3290 DATA 5500 INCW 0000
3300 DATA 5510 SUBR NOUN ' Get Noun
3310 DATA 5520 FLAG STOP
3320 DATA 5530 ADDN 0002 ' And add it to T$(2)
3330 DATA 5540 PROC 12000 ' Put Object in Words
3340 DATA 5550 PROC 11500 ' Get Attribute of Object
3350 DATA 5560 EXIT
3360 DATA 5700 TEST W015 5710 NEXT ' Check for OBJECT
3370 DATA 5705 TEST W016 NEXT 5800 ' or BLOCK
3380 DATA 5710 INCW 0000
3390 DATA 5720 TEST W004 NEXT 0900 ' Are
3400 DATA 5730 INCW 0000
3410 DATA 5740 JUMP 5820
3420 DATA 5800 TEST W003 NEXT 0900 ' Is
3430 DATA 5810 INCW 0000
3440 DATA 5820 TEST W039 NEXT 5828 ' There
3450 DATA 5825 INCW 0000
3460 DATA 5828 TEST P??? NEXT 0900 ' Check for any Preposition
3470 DATA 5830 STR+ 0002
3480 DATA 5840 INCW 0000
3490 DATA 5850 SUBR NOUN ' Get Noun
3500 DATA 5860 FLAG STOP
3510 DATA 5870 ADDN 0002
3520 DATA 5880 PROC 12400 ' Perform What in BASIC
3530 DATA 5890 EXIT
3540 DATA 6000 INCW 0000 ' IS Question
3550 DATA 6010 NULL 0002
3560 DATA 6020 TEST W039 NEXT 6025 ' There
3570 DATA 6022 INCW 0000
3580 DATA 6025 SUBR NOUN ' Get Noun
3590 DATA 6030 FLAG STOP
3600 DATA 6040 ADDN 0002
3610 DATA 6050 TEST P??? NEXT 0900 ' Check for any Preposition
3620 DATA 6060 STR+ 0002
3630 DATA 6070 INCW 0000
3640 DATA 6080 SUBR NOUN ' Get Noun
3650 DATA 6090 FLAG STOP
3660 DATA 6100 ADDN 0002
3670 DATA 6110 PROC 16000 ' Perform IS in BASIC
3680 DATA 6120 EXIT
3690 DATA 7000 LOAD IOLIST ' Load IOLIST to Process SAVE /LOAD /CLEAR
3700 DATA ***
3710 REM *****
3720 REM LIST TO CHECK FOR AN OBJECT AND CALL ROUTINE AT 17000
3730 REM *****
3740 DATA 0005 PROC 10000 ' Set number of objects to 0
3750 DATA 0008 PROC 10600 ' Clear out all object info
3760 DATA 0010 TEST W001 0025 NEXT ' Test for A or THE
3770 DATA 0015 TEST W002 0025 NEXT
3780 DATA 0018 TEST W033 0025 NEXT ' Test for IT
3790 DATA 0020 JUMP 0300
3800 DATA 0025 PROC 10100 ' Increment object number
3810 DATA 0026 PROC 10200 ' Save Object type A/THE/IT
3820 DATA 0027 TEST W033 0190 NEXT
3830 DATA 0028 NULL 0001
3840 DATA 0030 INCW 0400
3850 DATA 0035 TEST A??? NEXT 0095 ' Test for adjective
3860 DATA 0040 STR+ 0001 ' Add adjective to T$(1)
3870 DATA 0045 INCW 0400
3880 DATA 0050 TEST W021 0070 NEXT ' Test for comma or AND
3890 DATA 0055 TEST W022 NEXT 0090
3900 DATA 0060 INCW 0400
3910 DATA 0065 TEST A??? 0040 0300 ' Test for adjective
3920 DATA 0070 INCW 0400
3930 DATA 0075 TEST W022 NEXT 0085 ' Test for AND
3940 DATA 0080 INCW 0400
3950 DATA 0085 TEST A??? 0040 0300 ' Test for adjective
3960 DATA 0090 PROC 10300 0001
3970 DATA 0095 TEST W015 0110 NEXT ' Test for BLOCK or OBJECT
3980 DATA 0098 TEST W016 0110 NEXT
3990 DATA 0100 TEST N??? NEXT 0300 ' Test for name
4000 DATA 0110 PROC 10400 ' Store object name
4010 DATA 0115 INCW 0200
4020 DATA 0120 TEST W019 NEXT 0200 ' WHICH
4030 DATA 0125 INCW 0400
4040 DATA 0130 TEST W003 NEXT 0300 ' IS
4050 DATA 0135 INCW 0400
4060 DATA 0140 TEST P??? NEXT 0300 ' Test for any preposition
4070 DATA 0150 PROC 10500 ' and store it
4080 DATA 0155 INCW 0400
4090 DATA 0160 JUMP 0010
4100 DATA 0190 INCW NEXT
4110 DATA 0200 PROC 17000 ' Find object in BASIC
4120 DATA 0205 FLAG STOP
4130 DATA 0210 EXIT
4140 DATA 0300 ERR= 0001 ' Syntax error
4150 DATA 0310 STOP
4160 DATA 0400 ERR= 0003 ' Out of words
4170 DATA 0410 STOP
4180 DATA ***
4190 REM *****
4200 REM LIST TO HANDLE SAVE / LOAD / CLEAR .
4210 REM *****
4220 DATA 0010 TEST C014 0050 NEXT ' Test for SAVE
4230 DATA 0020 TEST C015 0070 NEXT ' Test for LOAD
4240 DATA 0030 TEST C016 0090 NEXT ' Test for CLEAR
4250 DATA 0040 EXIT
4260 DATA 0050 CFZ= 0001 ' Set Save Flag
4270 DATA 0060 JUMP 0100
4280 DATA 0070 CFZ= 0002 ' Set Load Flag
4290 DATA 0080 JUMP 0100
4300 DATA 0090 CFZ= 0003 ' Set Clear Flag

```



# PROGRAM FILE

```

4310 DATA 0100 INCV 0140
4320 DATA 0110 TEST W002 NEXT 0130 ' Test for THE
4330 DATA 0120 INCV 0200
4340 DATA 0130 TEST N004 NEXT 0200 ' Test for BOARD or GRID
4350 DATA 0140 PROC 15500 ' Jump to BASIC routine
4360 DATA 0150 EXIT
4370 DATA 0200 ERR= 0001 ' Syntax Error
4380 DATA 0210 STOP
4390 DATA ***
4400
4410 REM SAVE "SETUP"
    
```



## Commodore 64 Logic Emulator by B Candler

This program will be of great value to anyone who likes to experiment with logic circuits, and also should be useful for teaching purposes.

The user may enter a circuit consisting of gates and latches into the computer, to see what it does (or to see if it works as planned!). The concept of a logic emulator is not new, but this program is as far as I know unique in that the 'circuit' in the computer's memory may actually be connected to the outside world via the user port. For example, you may design a burglar alarm and connect it to the sensors which you are going to use. Changes in the circuit are easily done — without touching a soldering iron, of course — and the circuit may be saved to disk or tape for future reference.

The procedure to use this program is as follows:

1) Design your circuit on paper. You may use AND, NAND, OR, NOR and XOR gates (all may have one to eight inputs, except XOR), plus inverters, and D flip-flops which have a positive edge-triggered clock input and negative edge-triggered set/reset inputs. If you need other units (shift registers, counters) then these are easily built up from the basic circuit elements.

2) Number each gate or flip-flop (sequentially from one) and give each point in the circuit a number. The circuit points are numbered 0-4095; points 0-229 are displayed on the screen, and points 0-9 may be set to 0 or 1 under keyboard control.

3) Enter the circuit into the computer,

using option 1 from the main menu. If you wish to tie an input to + or -, type '+' or '+VE', or '-' or '-VE' or 'GND' as appropriate when asked for an input point. If you wish to leave an output unconnected, type 'NC'.

4) To 'run' the circuit, use option 2. If you wish to connect the user port to your circuit, type a number from 0 to 7 (according to which bit of the user port you are interested in), followed by 'O' or 'I' (for output or input), and then the number of the circuit point which you wish to connect the user port to, then RETURN. Type 'S' when you are ready to start execution.

5) Circuit points 0-9 may be set to a '0' value using the top row of number keys (1 to 0), or set to a '1' value using the keys from Q to P. All other circuit points will be automatically updated, using the circuit data you have entered. The logic states of point 0-229, plus the user port, are continuously displayed as a table onscreen.

6) To stop, press F7. Pressing 'M' will now take you to the main menu, where you may edit, save, load, list or clear the circuit.

Note that the circuit data is *not* lost when the program is stopped and re-run, or even when other programs are loaded.

As stated, there are 4096 circuit points and there is 12k for storage of gates (each gate uses three bytes plus two bytes per input, or 13 bytes total for a D flip-flop) so huge circuits are possible, you could try designing your own computer using discrete logic!

```

5 IF L=1 THEN 1350
10 IF PEEK(56)>00 THEN POKE 56,00:CLR:GOSUB 99500:GOTO 99600
20 DATA A5,C5,C9,03,00,01,00,AD,01,DD,05,FB,A2,00,0D,E0,2225
21 DATA 5F,05,FC,BD,E1,5F,05,FD,A9,00,0A,46,FB,EA,00,02,2413
22 DATA A9,01,05,02,01,FC,0A,20,03,05,02,91,FC,E0,E0,1000
23 DATA 10,00,00,A2,00,06,FB,0D,F0,5F,05,FC,BD,F1,5F,05,2557
24 DATA FD,A0,00,B1,FC,10,F0,01,30,66,FB,E0,E0,10,00,2420
25 DATA E6,A5,FB,0D,01,DD,A5,C5,A2,00,00,30,51,F0,17,E0,2378
26 DATA E0,14,00,F0,F0,2E,31,51,32,57,33,45,34,52,35,54,1642
27 DATA 36,50,37,55,30,49,0A,4A,EA,05,FC,A9,00,05,FD,A0,2054
28 DATA 00,0A,A2,00,0A,00,01,E0,0A,05,02,B1,FC,0A,20,03,1507
29 DATA 05,02,91,FC,A9,00,05,FD,A9,70,05,FE,A0,00,B1,FD,2217
30 DATA 29,07,00,03,4C,44,51,05,02,B1,FD,4A,4A,4A,29,07,1319
31 DATA AA,E0,06,05,B1,FD,0A,A0,00,2A,05,64,A5,02,C9,07,1096
32 DATA 00,03,4C,A5,51,A2,00,C9,03,00,01,E0,06,63,A0,01,1702
33 DATA B1,FD,05,61,C0,B1,FD,05,62,C0,B1,FD,05,FB,C0,B1,2912
34 DATA FD,05,FC,C0,A0,00,A1,FB,29,01,A6,02,CA,40,0A,4A,2100
35 DATA AA,00,E0,01,F0,07,E0,02,F0,06,25,63,2C,05,63,2C,1546
36 DATA 45,63,05,63,C0,05,00,02,A5,02,4A,00,06,A5,63,49,1077
37 DATA 01,05,63,04,FB,A5,FD,10,05,FB,05,FD,A5,FE,69,00,2320
38 DATA 05,FE,A0,00,B1,61,0A,29,03,05,63,91,61,4C,9E,50,1535
39 DATA 30,3E,30,09,00,0E,00,11,10,16,13,19,10,1E,1B,21,432
40 DATA 20,26,23,29,A0,00,05,FB,A0,00,05,FC,A9,65,05,FD,2005
41 DATA A9,04,05,FE,A9,17,05,02,A9,0A,05,65,A0,00,B1,FB,1000
42 DATA 29,01,09,30,B1,FD,E0,FB,00,02,06,FC,A9,02,4A,65,2106
43 DATA C0,01,00,02,A9,16,10,05,FD,05,FD,A5,FE,69,00,05,2015
44 DATA FE,C6,65,00,07,C6,02,00,CF,4C,09,52,A9,00,05,FB,2311
45 DATA A9,00,05,FC,A0,00,00,01,FB,C0,00,FB,E6,FC,A5,FC,2916
46 DATA C0,70,00,F0,00,A0,01,B1,FD,99,64,00,C0,00,00,2314
47 DATA F0,A0,00,B1,0D,29,03,C9,02,00,06,A9,01,05,64,00,1764
    
```

# MICROMART

**NEW**  
Impregnated  
removes static build-up



## ANTI-STATIC CLOTH

99p per cloth packed and delivered  
includes p&p



Specially made in West Germany for  
Minky International  
Vale Mill (Rochdale) Ltd  
John Street, Rochdale  
Lancashire OL16 1HR

## WHY PAY MORE??

**FERRANTI ADVANCE 86B**  
IBM PC compatible micro with: integrated Spreadsheet, Wordprocessor, and Database and BASIC A. Used by many organisations including British Steel and British Rail.

**ONLY £1086**

including monitor and box of disks and paper.

### COMPLETE BUSINESS SYSTEM

Advance 86B Micro, Printer and Monitor. SAGE Accounts Software. Integrated Spreadsheet, Wordprocessor, & Database and BASIC A. Box of Disks and Paper.

**ONLY £1650**

Change your data into graphs and really illustrate your work

**"DATAPLOT"** The easy to use graphics package for IBM PCs and compatibles, Apricots, Wren. Links to most spreadsheets and comma-delimited files.

**£180**

Other software at very competitive prices.

### Leicester Computer Systems

26 Brookfield Way, Kibworth  
Leicester LE8 0SA

**Tel: Leicester (0533) 541030**

## ALL TYPES OF BUSINESS COMPUTER SYSTEMS BOUGHT, SOLD AND EXCHANGED

**SAGE SOFTWARE  
AVAILABLE**

**ALL TYPES OF NEW  
EQUIPMENT SUPPLIED**

**CALL: 0602 761067**

**AURAGOLD  
COMPUTING LTD**

**"MAINLINE"  
BULWELL  
NOTTINGHAM**



## ALGOL 68

THE language for the  
APRICOT

- ★ you work interactively as in BASIC
- ★ comprehensive numerical facilities as in FORTRAN
- ★ low-level system Features as in C
- ★ tight compile checking as in PASCAL

and much, much more!

£385 + VAT

[a a]

Tel:  
(0206) 843385

ALGOL  
APPLICATIONS LTD

369 IPSWICH ROAD  
COLCHESTER  
ESSEX  
CO4 4HL

## 5 1/4" Floppies

Just 99p each

(in 10s) excl. VAT

Suitable for use on nearly all 5 1/4" floppy microcomputers including: BBC, IBM, MicroDigital, Sanyo, Apple, Tandy etc, including 96tpi systems.

Manufacturers' over-run of DS/DD floppy disks allows us to make this special offer. Note that these are full specification disks, not sub-standard drop-outs.

Prices: 1+ £1.25 each; box of 10 £9.90; 5+ boxes £9.00 per box. Plastic Library boxes £1.75 extra.

Branded disks — including FUJI with a lifetime guarantee.

		BASF/SM			FUJI		
Prices (each)		1+	10+	50+	1+	10+	50+
5 1/4"	SS/SD	1.85	1.40	1.20	—	—	—
	SS/DD	2.10	1.80	1.60	2.40	1.99	1.75
	DS/DD	2.40	2.10	1.90	3.30	2.95	2.50
	SS 96tpi	2.55	2.25	2.05	—	—	—
	DS 96tpi	2.90	2.65	2.40	3.95	3.65	3.10
8"	SS/SD	1.90	1.60	1.40	2.95	2.65	2.10
	SS/DD	2.25	2.05	1.85	—	—	—
	DS/SD	—	—	—	3.55	3.20	2.70
	DS/DD	2.50	2.30	2.05	3.65	3.30	2.80

Add 75p P&P + VAT on total amount — Minimum order 4 disks. Gov. Depts etc may telephone their order to 0908 310896.

Cheques payable to "IDS" and sent with order to:

**IDS (Computer Supplies)**

Disk Sales, 5 Castlesteads, Bancroft, Milton  
Keynes MK13 0PS

## USED COMPUTER BARGAINS

Hewlett Packard HP125, as new, twin drives, screen, keyboard and lots of software, £995 each (2 only). Cost new £3,500.

Sharp MZ3500, runs CP/M, two 350K disks, MX80 printer, some software, as new £895

Tycom Microframe, runs CP/M86 and MSDOS, no software £495

Tandy Model II, twin 8" drives and top quality d/w printer, good condition, some software £995

ACT 800, twin 8" drives, screen and keyboard, no software £295

Corvus, 20 meg hard disk for Commodore 8000 with Multiplexor and hardbox, one only £995

Apple IIe, disk drive, monitor, printer £595

Apple II 64K, disk drive, monitor £395

Comart Communicator, 5 meg hard disk and Newbury terminal £995

Eagle 4, 10 meg hard disk, some software £995

NEC Spinwriter, SS feeder and hood £350

TEC d/w printer £295

Northstar Advantage and MX80 printer £795

Commodore PC, runs IBM software, new £1,395

## MICROSAVE SYSTEMS

Tel: 021-706 9748

021-744 6228 after 6pm

ALL PRICES PLUS VAT

```

48 DATA 1C,B1,6F,29,03,C9,02,00,06,A9,00,85,64,F0,0E,B1,1610
49 DATA 09,29,03,C9,01,00,06,B1,6B,29,01,85,64,B1,65,0A,1412
50 DATA 29,03,05,64,91,65,A5,64,4A,A9,00,6A,05,61,B1,FD,1669
51 DATA 29,7F,05,61,91,FD,A5,64,4A,01,05,63,A5,67,85,61,1737
52 DATA A5,09,05,62,00,00,4C,13,51,AD,01,DD,05,FB,A9,84,1929
53 DATA 85,FC,A9,04,85,FD,A9,08,85,FE,A9,18,46,FB,2A,00,2224
54 DATA 00,91,FC,A5,FC,18,6B,28,85,FC,A5,FD,69,00,85,FD,2227
55 DATA C6,FE,00,E6,4C,00,50,A9,00,AE,01,5F,A0,00,28,BA,1863
56 DATA FF,AD,00,5F,A2,02,A0,5F,20,00,FF,A9,FC,05,FB,A9,2392
57 DATA 8F,85,FC,A9,FB,AE,FE,5E,AC,FF,5E,20,08,FF,60,85,2723
58 DATA FB,85,65,A5,FC,85,66,A4,02,A2,00,B1,65,81,65,E6,2203
59 DATA 65,00,02,E6,66,A5,66,CD,09,5F,90,EF,F0,ED,AD,00,2460
60 DATA 5F,F0,08,AD,08,5F,85,65,AD,09,5F,85,66,A2,00,00,2314
61 DATA 14,A1,65,91,65,A5,65,C5,FB,D8,06,A5,66,C5,FC,F0,2412
62 DATA 8D,A5,65,D8,02,C6,66,C6,65,4C,91,52,00,00,00,1567
90 K=24540:POKEK,0:POKEK+2,3
92 G0="AND(SPC)NANDOR(2SPC)NOR(SPC)XOR(SPC)INW,F/F."
95 NG=PEEK(K-2)+256*PEEK(K-1)+PT=PEEK(K-4)+256*PEEK(K-3)
97 Z$="HOME][13C0]"
98 FORK=0TO7:OR(K)*0:PT(K)=1000+K:NEXT
200 FD=0:PRINT"[CLR][RVS](SPC)COMMODE 64 REAL-TIME LOGIC EMULATOR(2SPC)"
205 PRINTNG;"GATE":IFNG<1THENPRINT"S"
207 PRINT"[SPC]IN CIRCUIT"
210 PRINT"[CD]PLEASE SELECT:"
220 PRINT"[CD](3SPC)1. ENTER GATES"
230 PRINT"[CD](3SPC)2. EXECUTE CIRCUIT"
240 PRINT"[CD](3SPC)3. EDIT/DELETE GATES"
250 PRINT"[CD](3SPC)4. SAVE CIRCUIT"
260 PRINT"[CD](3SPC)5. LOAD CIRCUIT"
265 PRINT"[CD](3SPC)6. LIST GATES"
270 PRINT"[CD](3SPC)7. CLEAR CIRCUIT"
280 PRINT"[CD](3SPC)8. END"
290 GET A$:ION VAL(A$) GOTO 300,600,1360,1270,1320,960,297,299
295 GOTO 290
297 G0="":INPUT"[CD]CLEAR CIRCUIT (Y/N)";Q$:IFQ$="Y"ORQ$="YES"THENGOSUB9000
298 GOTO200
299 PRINT"[CLR]";:END
300 PRINT"[CLR][RVS](SPC)ENTER GATES(28SPC)"
305 PRINT"GATE #";NG+1
307 IFFD=1THENPRINT"[CD][RVS]REPLACE MODE"
310 PRINT"[CD]PLEASE SELECT:"
313 IFFD=0THEN320
315 PRINT"[CD][RVS]1[OFF](SPC)AND(2SPC)[RVS]2[OFF](SPC)NAND(2SPC)[RVS]3[OFF]";
316 PRINT"[SPC]OR(2SPC)[RVS]4[OFF](SPC)NOR"
317 PRINT"[RVS]5[OFF](SPC)XOR(2SPC)[RVS]6[OFF](SPC)INW.(2SPC)[RVS]7[OFF]";
318 PRINT"[SPC]IF/F[SPC][RVS]8[OFF](SPC)SCRUB";GOTO400
320 PRINT"[CD](2SPC)1. AND"
330 PRINT"[2SPC]2. NAND"
340 PRINT"[2SPC]3. OR"
350 PRINT"[2SPC]4. NOR"
360 PRINT"[2SPC]5. XOR"
370 PRINT"[2SPC]6. INVERT"
380 PRINT"[2SPC]7. D FLIP-FLOP"
390 PRINT"[2SPC]8. LOGIC EMULATOR MENU"
400 GET A$:V=VAL(A$):IFV<1ORV>8THEN400
403 IFV=8THENIFFD=0THEN200
404 IFV=8THENR=0:NS=NS-1:GOTO520
405 IFFD=1THENPRINT"[CD][RVS]";MID$(G$,V*4-3,4):GOTO415
410 PRINTLEFT$(Z$,V+6);"[RVS](SPC)";V;"[CL]";
415 IF V=7THEN540
420 IFFD=0THENPRINTZ$
425 PRINT"[CD]OUTPUT POINT";:IOO=1:GOSUB8000:IOO=0
430 R=1:GOSUB 9100:R=3
450 NI=7-V:IF V=5 OR V=6 THEN 470
460 NI=0:INPUT"[CD]NUMBER OF INPUTS (1-8)";NI:IFNI<1ORNI>8THEN460
470 FORK=1TONI
480 PRINT"INPUT POINT";:IFNI=1THENPRINTK;
485 GOSUB8000:GOSUB9100:R=R+2:NEXTK
490 G0="":INPUT"[CD]OK";Q$:IFQ$="N"ORQ$="NO"THEN300
500 IFQ$="Y"ANDQ$="YES"THENPRINT"[2CU]";:GOTO490
510 POKE PT,(NI-1)*8+V:PT=PT+R:NG=NG+1
520 IFFD=1THENPT=PS-LL+R:NG=NS:P=PR:H=INT(P/256):POKE252,H:POKE251,P-H*256
523 IFFD=1THENPOKE24320,0:POKE2,20-R:SYS21087
525 H=INT(PT/256):L=PT-H*256:POKE24536,L:POKE24537,H:POKEPT,0
530 H=INT(NG/256):L=NG-H*256:POKE24538,L:POKE24539,H:IFFD=1THEN200
535 GOTO 300
540 IFFD=0THENPRINTZ$
545 PRINT"[CD] OUTPUT POINT";:IOO=1:GOSUB8000:R=1:GOSUB9100
550 PRINT"[R]";:PRINT"Q OUTPUT POINT";:GOSUB8000:R=3:GOSUB9100
560 IO=0:PRINT"[CD]CLK INPUT";:GOSUB8000:R=5:GOSUB9100
570 PRINT"[CD] INPUT";:GOSUB8000:R=7:GOSUB9100
580 PRINT"[3R]";:PRINT"SET INPUT";:GOSUB8000:R=9:GOSUB9100
590 PRINT"[5R]";:PRINT"RESET INPUT";:GOSUB8000:R=11:GOSUB9100
595 NI=1:R=13:GOTO490
600 PRINT"[CLR]"*TAB(20);"[1-30](SPC)1[SPC]2[SPC]3[SPC]4[1-35](SPC)6[SPC]7[SPC]8[SPC]9";
602 PRINT"[3SPC]USER PORT(5SPC)[3+*][1+][9+*][1+][9+*][CU]";
604 FORK=0TO20STEP10:A=K:PRINT"PRINTTAB(16)";
605 IFLEN(A$)<4THENA$=" "A$;GOTO605
606 GOSUB9200:PRINT"[1-9](SPC)[1-1][8SPC]";
608 NEXTK:FORK=0TO96STEP40:POKEK+55335,PEEK(646):NEXTK
610 PRINT"[HOME][2CD][0A][3+*][6R][1+][6R][4+*][6R][1+][6S]"
620 FORK=0TO7
630 PRINT"[1-3PB]";CHR$(48+K);"[1-3]";CHR$(73+6*K):"[1-3]";A=PT(K):GOSUB9200
635 PRINT"[1-3]";[1-3]";NEXTK
640 PRINT"[02][3+*][0E][1+*][0E][4+*][0E][1+*][0X]"
650 PRINT"[3SPC]1[2SPC]1[3SPC][02]0/1"
660 PRINT"[0SPC]1/0[0X][2SPC][1-3]"
670 PRINT"[0SPC][02]0CIRCUIT"
680 PRINT"[9SPC]POINT"
690 G0="HOME][17CD]"
700 FORK=1TO4:Q0$=Q0$+"[16SPC][CD]";NEXTK:Q0$=Q0$+"[4CU]"
710 PRINTQ0$;"SELECT";PRINT"(2SPC)0-7 (PORT)";PRINT"(SPC)OR 5 TO START"
720 PRINT"[SPC]OR M FOR MENU"
722 FORK=1TO4:PRINT"[14SPC]";IFK<4THENPRINT
723 NEXTK
725 GETA$:IFA$="*"THEN725
730 GETA$:IFA$="M"THEN200
740 IFA$="S"THEN900
750 V=VAL(A$):IF(V=0ANDAS$="0")ORV>7THEN730
760 PRINTQ0$;"1" OR "0" ?";LEFT$(Q0$,V+4);"[5CR][RVS](SPC)[OFF][CL]";
770 GETA$:IFA$="1"THENND(R)=0:PRINT"1";GOTO790
780 IFA$="0"THENND(R)=1:PRINT"0";GOTO790
785 GOTO770
790 PRINTQ0$;"CIRCUIT";PRINT"POINT";LEFT$(Q0$,V+4);"[7CR][4SPC][4CL][RVS](SPC)[OF F][CL]";
800 L$=" "
810 GETA$:IFA$=CHR$(13)THEN900
815 IFA$=CHR$(20)THENIFL$="*"THEN860
820 IFA$="0"ORAS$="9"THEN810
830 IFLEN(L$)=4THEN810
840 L$=L$+A$:PRINTA$;IFLEN(L$)<4THENPRINT"[RVS](SPC)[OFF][CL]";
850 GOTO 810
860 IFLEN(L$)<4THENPRINT"[SPC][CL]";
870 PRINT"[CL][RVS](SPC)[OFF][CL]";

```



# PROGRAM FILE

# MICROMART

## BBC MICRO CHIPS

8271 ..... £45.00

*... but hurry!*

OTHER CHIPS FOR DFS

74LS00	28p
74LS10	25p
7438	40p
74LS123	£1.00
74LS393	£1.20
4013	60p
4020	90p
2764 (250ns)	£4.20
27128 (250ns)	£8.50

24-HOUR DISPATCH

Orders under £10 add P&P 60p. Add 15% VAT to all UK orders

(0252) 515666

**marlelec limited**

43 QUEENS RD, FARNBOROUGH,  
HANTS GU14 6JP

## BUFFER YOUR PRINTER

5 pages in 10 seconds from WORDWISE?

Our 16/P Buffer will handle BBC/Epson and many others. Centronics compatible for Apple, IBM pc, NEC etc. 16k bytes — approx 3000 words. Leads incl.

£97.60

Mains Controller — driven by your Micro. Four separate appliances, each 3 amp 240V, independently controlled. Neat IEC outlet sockets. BBC Software included.

£85.60

Filtered Distribution Board — keep spikes and interference from your system. Four IEC mains outlets to suit micro, monitor, printer etc. Manufactured by Rendar.

£22.60

(6-way unfiltered also available at £17.95)

Printers at special discounts. Send for brochure:

Micro System Specialists  
6 Airlie Drive, Monifieth,  
DUNDEE  
Tel: (0382) 533557

PRINTER BUFFER  
Only £97.60  
All prices include VAT & carriage

## COMPUTER REPAIRS

- ★ COMPUTERS (Business & Personal)
- ★ DISK DRIVES (5 1/4", 8", 3")
- ★ WINCHESTERS
- ★ MONITORS
- ★ VDUs
- ★ PRINTERS
- ★ WORKSHOP REPAIR CONTRACTS
- ★ Fixed repair charges
- ★ 3 months warranty on repaired part
- ★ 48 hour service for disk drive alignment

**A.N. ELECTRONIC & COMPUTER SERVICES LTD**

130B North Lane, Aldershot, Hants  
Tel: Aldershot (0252) 25608

```

800 L=LEFT$(L$,LEN(L$)-1):GOTO810
805 A=VAL(L$):IFA>4095THEN790
815 PT(V)=A:PRINTLEFT$(Q$,V+4):*(7CR):*IGOSUB9200:GOTO710
820 PRINTQ$:"F7 TO STOP:PRINT(CD)(RVS)KEYBOARD:PRINT(RVS)CONTROLS:"
825 PRINT"0123456789:PRINT"([10*])
830 PRINT"1234567890[SPC]:[SPC]10"
835 PRINT"QWERTYUIOP[SPC]:[SPC]11"
840 DR=0:P=120:IFORR=7:TO0STEP-1:DR=DR+P*DR(K):P=P/2:NEXTK:POKE56579,DR
845 Q=PT(R)*PT(R)+24544:IFORR=0:TO7:IFORR(K)=1:THENZ=24543:IGOSUB9100:GOTO940
850 Z=PT(K)+24576:IGOSUB9100
855 PT=PT+2:NEXTK:IFORR=0:TO7:Z=PT(K)+24576:IGOSUB9100:PT=PT+2:NEXTK:PT=Q
860 SYS20400:GOTO710
865 PRINT(CLR)(RVS)[SPC]LIST GATES(29SPC)
870 Q$="":INPUT(CD)SCREEN OR PRINTER (S/P):*Q$
880 IFQ$(C)"S"THENIFQ$(C)"P"THEN200
890 PRINT(CD)PRESS SPACE TO PAUSE"
1000 IFQ$="P"THENOPEN4,4:GOTO1010
1005 OPEN4,3
1010 FORG=1:TO7:IF=0:GN=0
1020 P=20672
1030 GN=GN+1:V=PEEK(P)AND7:IFV=0THENNEXTG:GOTO1190
1035 GETA$=IFA$="[SPC]":THEN1240
1040 IF G=V THEN 1070
1050 IF V=7 THEN P=P+13:GOTO1030
1060 P=P+(PEEK(P)AND56)/4+5:GOTO1030
1070 IF F THEN 1110
1080 PRINT#4:PRINT#4,"[RVS]":MID$(G$,G*4-3,4)
1090 IFV<7THENPRINT#4:PRINT#4,"GATE# 0/P. INPUT":CHR$(83+51*(V=6)):GOTO1110
1095 PRINT#4,"[12SPC]([R])(13SPC)(3R)(2SPC)(5R)"
1100 PRINT#4,"GATE#(2SPC)(4SPC)(3SPC)CLK(2SPC)DATA(2SPC)SET(2SPC)RESET"
1110 F=1:A=GN:IGOSUB9300
1115 IFV=7THENNI=4:GOTO1120
1120 NI=(PEEK(P)AND56)/8
1125 FORK=1:TO1+2
1130 L=PEEK(P+K*2-1)+256*PEEK(P+K*2)
1140 IF L=24542 THEN PRINT#4,"(2SPC)+VE":GOTO1170
1150 IF L=24540 THEN PRINT#4,"(2SPC)GND":GOTO1170
1155 IF L=24543 THEN PRINT#4,"(3SPC)INC":GOTO1170
1160 A=L-24576:IGOSUB9300
1170 NEXT K
1180 PRINT#4:GOTO1050
1190 PRINT#4:CLOSE4
1200 PRINT(CD)PRESS ANY KEY TO RETURN TO MENU"
1210 GETA$=IFA$(">")THEN1210
1220 GETA$=IFA$(">")THEN1220
1230 GOTO200
1240 IFPEEK(197)=60THEN1240
1245 GETA$=IFA$(">")THEN1245
1250 GETA$=IFA$(">")THEN1250
1260 GOTO1040
1270 PRINT(CLR)(RVS)[SPC]SAVE CIRCUIT(27SPC)
1280 GOSUB9400
1290 POKE24320,LEN(N$):POKE24321,DE
1300 IFN$=""THENFORK=1:TOLEN(N$):POKE24321+K,ASC(MID$(N$,K,1)):NEXTK
1305 FORK=0:TO3:POKE28668+K,PEEK(24536+K):NEXTK
1307 Q=PT:PT=24318:R=0:Z=Q+1:IGOSUB9100:PT=Q
1310 SYS21047:GOTO200
1320 PRINT(CLR)(RVS)[SPC]LOAD CIRCUIT(27SPC)
1330 GOSUB9400
1340 FL=1:LOAD(N$),DE,1
1350 FL=0:FORR=0:TO3:POKE24536+K,PEEK(28668+K):NEXTK:GOTO90
1360 PRINT(CLR)(RVS)[SPC]EDIT/DELETE GATE(23SPC)
1370 G=0:INPUT(CD)GATE #:[GN]:IFGN<10RGN:NGTHEN200
1380 PRINT(CD)SEARCHING:IP=20672:IFGN=1THEN1430
1390 FORK=1:TOGN-1
1400 Z=PEEK(P):IF(ZAND7)=7 THEN P=P+13:GOTO 1420
1410 P=P+(ZAND56)/4+5
1420 NEXTK
1430 G=PEEK(P)AND7:PRINT(CU)(RVS):MID$(G$,G*4-3,4):*(5SPC)(CD)
1440 IFG=7THENNI=4:GOTO1455
1450 NI=(PEEK(P)AND56)/8
1455 I$="Q(4SPC)(1R)(CD)(CL)Q(4SPC)(CD)CLK(4SPC)(CD)DATA(4SPC)(CD)SET(4SPC)RESET"
1460 FORK=1:TO1+2
1465 IFG=7THENIFK<4THENPRINTLEFT$("([5R]),K*2-7)
1465 IFG=7THENPRINTMID$(I$,K*5-4,5):GOTO1490
1470 IFK=1THENPRINT"OUTPUT":GOTO1490
1480 IFNI=0THENPRINT"INPUT":GOTO1490
1485 PRINT"INPUT":K-1,
1490 L=PEEK(P+K*2-1)+256*PEEK(P+K*2)
1500 IF L=24542 THEN PRINT"[SPC]+VE":GOTO1540
1510 IF L=24540 THEN PRINT"[SPC]GND":GOTO1540
1520 IF L=24543 THEN PRINT"[2SPC)INC":GOTO1540
1530 A=L-24576:IGOSUB9200:PRINT
1540 NEXT K
1550 PRINT(CD)1. DELETE THIS GATE"
1560 PRINT"2. EDIT THIS GATE"
1570 PRINT"3. RETURN TO LOGIC EMULATOR MENU"
1580 GETA$=IVAL(A$):OMGOTO1600,1600,200
1590 GOTO1500
1600 LL=NI*2+5:POKE2,LL:H=INT(P/256):POKE252,H:POKE251,P-H*256
1610 POKE24320,V-1:SYS21007:FD=1:IFV=1THENPT=PT-LL:NG=NG-1:GOTO525
1620 PRINT(CU):*IFORR=1:TO3:PRINT"([32SPC]):NEXTK
1625 PRINT(CU)RE-ENTER THE DETAILS OF THIS GATE"
1627 PS=PT:NG=NG:PT=P:NG=GN-1:GOTO310
8000 Z=-1:Y$="":INPUT Y$:IFY$="+"ORY$="+"VE"ORY$="NC"THENZ=24543+(00=0):RETURN
8010 IFY$="-"ORY$="-"VE"ORY$="GND"THENZ=24543+3*(00=0):RETURN
8020 Z=VAL(Y$):IFZ<0ORZ>4096ORZ=0ANDY$=""0"THENPRINT" MUST BE 0-4095":GOTO8000
8030 Z=Z+24576:RETURN
8000 POKE24538,0:POKE24539,0:POKE24536,0:POKE24537,112:SYS20076
8010 NG=0:PT=20672:POKEPT,0:RETURN
9100 H=INT(Z/256):L=Z-H*256:POKEPT+R,L:POKEPT+R+1,H:RETURN
9190 PRINT"[SPC]"
9200 FZ=0
9205 A$=MID$(STR$(A),2)
9210 IFLEN(A$)<4THENA$=" "A$:GOTO9210
9220 IFZ=0THENPRINTA$:RETURN
9230 PRINT#4,A$:RETURN
9300 PRINT#4,"[SPC]":IFZ=1:GOTO9205
9400 DE=1:Y$="":INPUT"TAPE OR DISK (T/D)":T$:IFT$="D"THENDE=0:GOTO9420
9410 IFT$(">")T$THEN8400
9420 N$="":INPUT(CD)FILENAME":N$:IFN$=""THENIFT$="D"THEN8420
9430 RETURN
9500 PRINT(CLR)READING M/C DATA - PLEASE WAIT(2CD)
9505 RESTOREIP=20480:FORR=0:TO42
9510 PRINT(CU):*42-K:*(CL)[SPC]
9512 T=0:FORJ=0:TO15:READZ:L=ASC(Z$)-48
9520 R=ASC(RIGHT$(Z$,1))-48
9530 B=L*16+112*(L>9)+R*7*(R>9):T=T+B:POKEP,B:P=P+1:NEXTJ
9540 READCC:IFCC<0THENPRINT"DATA ERROR, LINE":J*20+K:END
9550 NEXTK:RETURN
READY.

```



## KINGSLEY ENTERPRISES

Organise your files on  
CentTech Colour  
discs

Specialists in all kinds of floppy diskettes

MAIL ORDER ONLY — ALL PRICES EXCLUDE VAT @ 15%

Diskette Prices per box of 10		1 box	2-4	5-9	10+
3"	HITACHI	SS:DD 96	41.00	39.00	38.00
3.5"	SONY	SS:DD 96	32.50	29.20	28.40
		DS:DD 96	44.60	40.00	38.80
5.25"	BASF	SS:DD 48	13.13	11.81	11.48
		SS:DD 48	16.25	14.63	14.22
		DS:DD 48	19.38	17.44	16.95
		DS:DD 96	20.63	18.56	18.05
		DS:DD 96	23.75	21.38	20.78
		DS:DD 96	41.88	37.69	36.64
5.25"	CENTECH	SS:DD 48	18.29	16.46	16.00
		DS:DD 48	24.25	21.83	21.22
		DS:DD 96	24.25	21.83	21.22
		DS:DD 96	32.06	28.86	28.05
5.25"	CUMANA	DS:DD 96	16.25	14.63	14.22
5.25"	DYSAN	SS:DD 48	18.13	16.31	15.86
		DS:DD 48	25.50	23.85	23.19
		DS:DD 96	26.50	23.85	23.19
		DS:DD 96	33.63	30.26	29.42
5.25"	NASHUA	SS:DD 48	11.65	10.48	10.19
		DS:DD 48	12.44	11.20	10.86
		DS:DD 48	14.74	13.27	12.90
		DS:DD 96	15.55	13.99	13.61
		DS:DD 96	17.09	15.38	14.95
		DS:DD 96	15.63	14.06	13.67
5.25"	SCOTCH-3M	DS:DD 48	19.38	17.44	16.95
		DS:DD 96	23.13	20.81	20.23
		DS:DD 96	25.00	22.50	21.88

8" hard sector and pre-formatted diskettes available  
20-30% Discounts on Software — Sample Software Prices (IBM PC)-  
Framework £350 WordStar 2000 £300 MS-Project £175  
Friday £130 Lotus 1-2-3 £300 MS-Word £275  
dBase II £245 Symphony £400 Multimate £230  
dBase III £340 WordStar Prof £265 Open Access £330  
dBase III/II £100 MS-Cart £175 SuperCalc III £205  
KINGSLEY ENTERPRISES  
87 Whitefield Road  
Stockton Heath  
Warrington  
WA4 6NB  
Tel: 0925 64207  
Postage per order: disks, 2-4 boxes £1.00;  
5-9 boxes £2.00; 10-20 boxes £3.00;  
Software, £100-£500, add £8.00;  
otherwise free delivery.

## KEY TO BRACKETED SYMBOLS

[HOME]	HOME	[RVS]	RVS ON (CTRL-S)
[CLR]	SHIFT+CLR	[OFF]	RVS OFF (CTRL-0)
[CR]	CRSR RIGHT	[SPC]	SPACE
[CL]	SHIFT+CRSR DOWN	[?]	SHIFT+'?'
[CD]	CRSR DOWN	[R]	COMMODORE+'R'
[CU]	SHIFT+CRSR UP		
[5SPC]	= 5 x SPACE		
[12TR]	= 12 x SHIFT+'R'		
[7CD]	= 7 x CRSR DOWN,		etc.



## Spectrum Nine Men's Morris

by Arthur Linton

Nine Men's Morris is a game for the Sinclair Spectrum 48k, and is based on the original two-player game which dates back to 1400 BC. Each player has nine counters, and the object of the game is to remove your opponent's counters by forming set patterns with your counters, called 'mills'.

The counters are placed on the board

alternately; when all the counters have been placed, they can be moved by sliding to an adjacent point. To form a mill you need to get three of your counters in a straight line, and if this is achieved you can then remove one of your opponent's counters. A player who is reduced to two counters or who is unable to move loses the game.

## MICRO FACTOR

presents

## MICRO-MECHANIC

Written for the every day driver. MICRO-MECHANIC is a simple to use program requiring no computer expertise.

At less than the price of an MOT failure, let MICRO-MECHANIC be your guide through the rules of the MOT test.

Be sure! Be safe!!

### Buying a second hand car?

Let MICRO-MECHANIC tell you what to look for in literally dozens of the most popular cars in the second hand car market.

MICRO-MECHANIC could help you avoid that costly mistake. Can you afford to take the risk?

Avoid being taken for a ride. Send for your copy of MICRO-MECHANIC, now available for BBC, AMSTRAD and 48K SPECTRUM computers, stating which version you require @ £9.95 per copy.

Cheques made payable to:

**MICRO FACTOR**  
**1A WHINBROOK GARDENS, LEEDS**  
**LS17 6AE**

Allow 28 days for delivery

## GENIE & TRS-80

Don't sell your computer upgrade to latest spec:-

Genie 48K RAM £39.95

Lowercase £24.95

Hi speed CPU £24.95

(Nearly double speed)

Centronics printer

interface £44.95

Interface board (9 ports)

ring for details £79.95

RS232-C interface from £59.95

Double density disc upgrade £69.95

Please add £1.50 p&p and 15% VAT

**ARC ELECTRONICS**  
**54 HERON DRIVE**  
**WAKEFIELD, W.YORKS**  
Tel: (0924) 253145

```

10 REM *****
20 REM NINE MEN'S MORRIS
30 REM by Arthur Linton 1985
40 REM -----
50 BORDER 5: PAPER 7: CLS : POKE 23658,8
60 IF PEEK 65368 <> 60 THEN 80 SUB 1560
70 PRINT AT 2,8;"NINE MEN'S MORRIS"; AT 3,8;"-----"
  ="; AT 5,7;"DO YOU WANT TO SEE"; AT 7,6;"THE INSTRUCTIONS? Y/N"
80 80 SUB 910
90 IF IS="Y" THEN 80 SUB 1440
100 DATA 1,1,6,10,1,15,22,1,24,4,4,9,11,4,15,19,4,21,7,7,12,12,
  7,15,16,7,18,2,10,6,5,10,9,8,10,12,17,10,18,20,10,21,23,10,24,9,
  13,12,13,13,15,18,13,18,6,16,9,14,16,15,21,16,21,3,19,6,15,19,15,
  24,19,24
110 DIM v(24): DIM y(24): DIM x(24)
120 RESTORE 100: FOR i=1 TO 24
130 READ v(i),y(i),x(i): NEXT i
140 BORDER 5: PAPER 6: CLS : 80 SUB 350
150 DIM c(24): DIM m(24): LET b=9: LET r=9: LET cb=0: LET cr=0
160 LET rnd=RND: IF rnd >= .5 THEN 80 TO 270
170 REM *****
180 REM BLUE'S TURN
190 REM -----
200 PRINT PAPER 1: INK 7: AT 19,0;"BLUE "; AT 19,27;"BLUE "; A
  T 20,0;"TO GO"; AT 20,27;"TO GO": LET col=1
210 IF b=0 THEN 80 SUB 680
220 IF b>0 THEN 80 SUB 570
230 80 SUB 970: 80 SUB 1250
240 REM *****
250 REM RED'S TURN
260 REM -----
270 PRINT PAPER 2: INK 7: AT 19,0;"RED "; AT 19,27;"RED "; A
  T 20,0;"TO GO"; AT 20,27;"TO GO": LET col=2
280 IF r=0 THEN 80 SUB 680
290 IF r>0 THEN 80 SUB 570
300 80 SUB 970: 80 SUB 1250
310 GO TO 200
320 REM *****
330 REM DRAW BOARD
340 REM *****
350 FOR i=1 TO 3
360 PLOT 24*i+27,187-24*i: DRAW 192-48*i,0: DRAW 0,48*i-192: DR
  AW 48*i-192,0: DRAW 0,192-48*i
370 NEXT i
380 PLOT 52,91: DRAW 47,0: PLOT 148,91: DRAW 47,0
390 PLOT 123,163: DRAW 0,-47: PLOT 123,67: DRAW 0,-47
400 FOR i=1 TO 24
410 PRINT AT y(i),x(i);"0"
420 PRINT AT y(i)-1,x(i)+1: CHR$(64+i)
430 NEXT i
440 FOR i=1 TO 9
450 PRINT INK 1: AT 2*i-1,1;"A"; INK 2: AT 2*i-1,30;"A"
460 NEXT i
470 PRINT INK 1: AT 0,0;"F-1"; AT 18,0;"L-1"; INK 2: AT 0,29;"F
  -1"; AT 18,29;"L-1"
480 FOR i=1 TO 17
490 PRINT INK 1: AT i,0;"I "; AT i,2;"I "; INK 2: AT i,29;"I "; A
  T i,31;"I "
500 NEXT i
510 PRINT AT 20,10;"PRESS LETTER"
520 RETURN
530 REM *****
540 REM PLACING COUNTERS
550 REM -----
560 BEEP .3,10
570 PRINT AT 21,9;"OF DESTINATION"

```



# PROGRAM FILE

# MICROMART

## COMPUTER SERVICE 8 WORKING HOUR RESPONSE

for

**£69.50 + VAT**

per system

Large savings on normal  
Maintenance costs

*Details on Registration can be  
obtained from:*

## SUMLOCK ELECTRONICS LIMITED

GOTHIC HOUSE  
MARKET PLACE  
PENKRIDGE  
STAFFS ST19 5DJ  
Tel: 078-571-515

Quick — before you spend £250  
on a WP

## PC JOTTER £45

A speedy, handy word processor/  
editor for the IBM PC and lookalikes  
— does all you need!

- Fast acting, up to 60K text files in RAM.
- Cursor movement to character, word, line ends, line, page, start and end of file.
- Autowrap and right margin justification if required. Adjustable margins and tabs.
- Keeps backup file, or read only (browse) mode.
- Find and replace functions.
- Block moves, print marked block, or write marked block to a file.
- Read a file into the text.
- Include control characters for direct control of your printer.

(Price excludes VAT. Order value,  
£45 + £6.75 VAT)

Cheque with order to:

**MICROCOSM COMPUTING**  
52 Tower Street, Harrogate HG1 1HS  
Tel: (0423) 62055

## AMERICAN (NTSC) VIDEO TAPES CONVERTED TO BRITISH (PAL) SYSTEM AND VICE VERSA

Fast Affordable Service, Phone

## Video Action Services

**Tel: 01-385 4244**

```

580 GO SUB 830: IF d>24 THEN GO TO 560
590 IF c(d) <> 0 THEN GO TO 560
600 LET c(d)=col
610 PRINT INK col; AT y(d),x(d);"A"
620 IF col=1 THEN PRINT AT 2*b-1,1;" ": LET b=b-1: GO TO 640
630 PRINT AT 2*r-1,30;" ": LET r=r-1
640 RETURN
650 REM *****
660 REM MOVE COUNTERS
670 REM -----
680 PRINT AT 21,9;" TO MOVE FROM "
690 GO SUB 830: IF d>24 THEN GO TO 760
700 LET d0=d: IF c(d0) <> col THEN GO TO 760
710 PRINT INVERSE 1; AT 21,9;" TO MOVE TO "
720 GO SUB 830: IF d>24 THEN GO TO 760
730 IF c(d) <> 0 THEN GO TO 760
740 IF y(d)=y(d0) AND ABS (x(d)-x(d0))=ABS (10-y(d))+3 AND y
(d)=10 THEN GO TO 770
750 IF x(d)=x(d0) AND ABS (y(d)-y(d0))=ABS (15-x(d))+3 AND x
(d)=15 THEN GO TO 770
760 BEEP .3,10: GO TO 680
770 LET c(d)=col: LET c(d0)=0
780 PRINT INK col; AT y(d),x(d);"A"; INK 0; AT y(d0),x(d0);"O"
790 RETURN
800 REM *****
810 REM KEY INPUT(move)
820 REM -----
830 IF INKEY$ <> "" THEN GO TO 830
840 IF INKEY$="" THEN GO TO 840
850 LET d=CODE INKEY$ -64: IF d<1 OR d>26 THEN BEEP .3,10: G
O TO 830
860 IF d=25 THEN LET col=3-col: GO TO 1350
870 RETURN
880 REM *****
890 REM KEY INPUT(aux)
900 REM -----
910 IF INKEY$ <> "" THEN GO TO 910
920 IF INKEY$="" THEN GO TO 920
930 LET i$=INKEY$: RETURN
940 REM *****
950 REM CHECK FOR MILL (row)
960 REM -----
970 LET dd=d: LET ddd=d
980 IF INT (dd/3) <> dd/3 THEN LET dd=dd+1: GO TO 980
990 LET e=dd-2: LET f=dd-1: LET g=dd
1000 IF c(e) <> 0 AND c(e)=c(f) AND c(f)=c(g) THEN GO SUB 1120
1010 IF d=26 THEN GO TO 1080
1020 FOR i=1 TO 24
1030 IF v(i)=ddd THEN GO TO 1050
1040 NEXT i
1050 IF INT (i/3) <> i/3 THEN LET i=i+1: GO TO 1050
1060 LET e=v(i-2): LET f=v(i-1): LET g=v(i)
1070 IF c(e) <> 0 AND c(e)=c(f) AND c(f)=c(g) THEN GO SUB 1120
1080 RETURN
1090 REM *****
1100 REM CAPTURE
1110 REM -----
1120 PRINT INK col; FLASH 1; AT y(e),x(e);"A"; AT y(f),x(f);"A"
; AT y(g),x(g);"A"
1130 PRINT AT 21,2;"OF "; "RED" AND col=1;"BLUE" AND col=2;"COU
NTER TO BE REMOVED"
1140 GO SUB 830: IF d=26 THEN GO TO 1190
1150 IF c(d)=0 OR c(d)=col OR m(d)=1 THEN BEEP .3,10: GO TO 114
0
1160 LET c(d)=0: PRINT INK 0; AT y(d),x(d);"O"
1170 IF col=1 THEN LET cr=cr+1: PRINT INK 2; AT 19-2*cr,1;"A":
IF cr=7 THEN GO TO 1350
1180 IF col=2 THEN LET cb=cb+1: PRINT INK 1; AT 19-2*cb,30;"A"
: IF cb=7 THEN GO TO 1350
1190 PRINT AT 21,0;" "
1200 PRINT INK col; FLASH 0; AT y(e),x(e);"A"; AT y(f),x(f);"A"
; AT y(g),x(g);"A"
1210 RETURN
1220 REM *****
1230 REM RESET MILL ARRAY
1240 REM -----
1250 FOR i=1 TO 24: LET m(i)=0: NEXT i
1260 FOR i=1 TO 22 STEP 3
1270 IF c(i) <> 0 AND c(i)=c(i+1) AND c(i+1)=c(i+2) THEN LET m(
i)=1: LET m(i+1)=1: LET m(i+2)=1
1280 LET e=v(i): LET f=v(i+1): LET g=v(i+2)
1290 IF c(e) <> 0 AND c(e)=c(f) AND c(f)=c(g) THEN LET m(e)=1:
LET m(f)=1: LET m(g)=1
1300 NEXT i
1310 BEEP .02,20: RETURN
1320 REM *****
1330 REM FINISH GAME
1340 REM -----
1350 PRINT AT 21,0;" "
1360 PRINT PAPER col; FLASH 1; INK 7; AT 19,26*(col=2);"WINNER"
; AT 20,26*(col=2);"WINNER"; FLASH 0; PAPER 6; AT 19,26*(col=1);
" " ; AT 20,26*(col=1);" "
1370 PRINT AT 20,10;"DO YOU WANT "; AT 21,8;"ANOTHER GAME Y/N"
1380 GO SUB 910
1390 IF i$="Y" THEN GO TO 140
1400 STOP
1410 REM *****
1420 REM INSTRUCTIONS
1430 REM -----
1440 CLS : PRINT ""NINE MEN'S MORRIS"" IS A GAME FOR TWO PLAY

```



## NO GIMMICKS! NO WAFFLE! SIMPLY THE BEST PRICE!

WORDSTAR PROFESSIONAL PACK

For  Personal Computer

£278

VER. 3.40

The latest version!



SAMPLE PRICES  
ON SOFTWARE



OVERSEAS AND TRADE  
ENQUIRIES WELCOME

WORDSTAR PROFESSIONAL PACK VER. 3.3....	£278
SUPERCALC 2/3.....	£145/£221
d BASE 2.....	£299
d BASE 3/FRAWORK.....	£389
OPEN ACCESS.....	£349
MULTIMATE V3.2 (UK).....	£259
LOTUS 1-2-3.....	£315
SYMPHONY.....	£440
R BASE 4000.....	£255
FILE VISION.....	£139
TK SOLVER.....	£239
KNOWLEDGE MANAGER.....	£325
WORDSTAR 2000.....	£339

By popular demand we are able to supply business, educational and recreational software at DISCOUNT PRICES for the following machines: Apple, Atari, BBC, Commodore, Vic 20, DEC Rainbow, IBM, ICL, Epson, Sinclair, Sirius, Spectrum, Texas, TRS 80, CPM 5¼ or 8 inch.

Please send SAE for full list

### PRODUCTS FOR IBM PC

SPOTLIGHT.....	£89
HARVARD PROJ MANAGER.....	£312
PLEASE.....	£249
ELECTRIC DESK.....	£225
CONCURRENT PC DOS.....	£189
STARLINK MULTIUSER.....	£1395
GRAPHIX PARTNER (everyone must have one)....	£99
PROKEY (and one of these too).....	£89
FORTAN-77.....	£219

Demo disks and literature are available for many of these products.

University, College and Public Authority orders welcome.

All prices plus VAT in UK. Phone your Access or Barclaycard number for immediate despatch (software sent post free by recorded delivery). Send any other ad to us and we'll beat the price.

### Photographic & Optical Services Ltd

129-137 STANLEY ROAD  
TEDDINGTON, MDDX.

Tel: 01-977 3498

Now open  
6 days a week!

Answering machine after business hours.  
Offers subject to availability.  
Telephone first to reserve.

Telex No. 885463 (Photo G)

```

ERS, ONE STARTING WITH NINE BLUE COUNTERS AND THE OTHER WITH N
INE RED."
1450 PRINT : PRINT "THE STARTER IS SELECTED, AT RANDOM, BY T
HE COMPUTER AND THE PLAYERS THEN, IN ALTERNATE TURNS, PLACE
COUNTERS ON THE VACANT POINTS."
1460 PRINT : PRINT "THE OBJECT OF THE GAME IS TO FORM A MILL
OR MILLS. A MILL IS A ROW OF THREE ON A STRAIGHT LINE. IF THI
S IS ACHIEVED THE PLAYER CAN REMOVE ONE OF THE OPPONENT'S C
OUNTERS. A PLAYER REDUCED TO TWO COUNTERS OR UNABLE TO MO
VE LOSES THE GAME"
1470 PRINT AT 21,15; INK 2;"PRESS ANY KEY": GO SUB 910
1480 CLS : PRINT "WHEN ALL THE COUNTERS HAVE BEEN POSITIONED, TH
E PLAY CONTINUES BY SLIDING A COUNTER ALONG A LINE TO THE AD
JACENT POINT, PROVIDED THAT IT IS VACANT, WITH THE SAME AIM O
F FORMING A MILL."
1490 PRINT : PRINT INK 2;"AFTER FORMING A MILL THE COUNTER TO BE
REMOVED MUST NOT BE PART OF A MILL."
1500 PRINT : PRINT "IF A COUNTER IN A MILL IS MOVED, AS MAY BE NE
CESSARY IN NORMAL PLAY, ALL COUNTERS IN THAT MILL BECOME VULNE
RABLE TO CAPTURE."
1510 PRINT : PRINT "IT MAY BE NECESSARY TO WAIVE THIS RIGHT O
F REMOVAL."; INK 2;" TO DO SO PRESS "Z"."; INK 0;" THIS IS THE
ONLY TIME A TURN MAY BE MISSED."; INK 2;" TO YIELD TO YOUR OPP
ONENT, AT ANY TIME, PRESS "Y".";
1520 PRINT AT 21,15; INK 0;"PRESS ANY KEY": GO SUB 910: RETURN
1530 REM *****
1540 REM GRAPHICS
1550 REM -----
1560 RESTORE 1580: FOR I=0 TO 7: READ k: POKE USR "a"+i,k: NEXT
I
1570 REM A A
1580 DATA 60,126,255,255,255,255,126,60
1590 RETURN
1600 REM *****

```

## Atari Yahtzee by Ken Hall

This version of the popular dice game Yahtzee is written for Atari 400/600/800 home computers. Very little needs to be said—all the instructions are within the program but the program shows all the capabilities of the Atari — redefined character sets, player/missile graphics, sound, and so on, making it very

professional and great fun to play. Type in listing 1 without the CLOAD at the end and make sure it works, add the CLOAD and save to tape. Then type in listing 2 and save it after listing 1 on tape. To play Yahtzee, rewind the tape and type CLOAD.

```

1000 GRAPHICS 0:POKE 710,18:POKE 712,178:POKE 752,1
1010 POSITION 12,9:?"[INV] [INV]":POSITION
12,10:?"[INV] LOADING DATA [INV]":POSITION 12,12:?"[INV]
[INV] [INV] [INV]"
1020 POSITION 12,14:?"[INV] PLEASE WAIT [INV]":POSITION
12,13:?"[INV] [INV]"
1025 POSITION 12,11:?"[INV] [INV]":POSITION
12,15:?"[INV] [INV]"
1030 Z=124:Q=(PEEK(106)-8)*256:FOR I=0 TO 1023:POKE
Q+I,PEEK(57344+I):Z=Z-0.1:POSITION 18,12:?" :NEXT I
1040 RESTORE 1060:FOR I=1 TO 43:READ ADDR:FOR J=0 TO 7:READ
C:POKE Q+ADDR+J,C:NEXT J:Z=Z-0.5
1050 POSITION 18,12:?" :NEXT I
1060 DATA
32,254,254,254,238,254,254,254,0,40,254,190,254,254,254,250,2
54,0,48,254,190,254,238,254,250,254,0
1070 DATA
56,254,186,254,254,254,186,254,0,64,254,186,254,238,254,186,2
54,0,72,254,186,254,186,254,186,254,0
1080 DATA
128,124,238,238,254,254,254,124,0,136,56,248,56,56,56,254,254
,0,144,124,198,28,112,254,254,254,0
1090 DATA
152,254,28,120,28,206,254,124,0,160,220,220,220,220,254,28,23
,0,168,254,224,252,14,238,254,124,0
1100 DATA
176,126,224,252,238,238,254,124,0,184,254,14,14,28,60,120,120
,0,192,124,238,124,238,254,254,124,0
1110 DATA
200,124,238,126,14,238,254,124,0,8,255,255,255,255,255,25,25
5,255
1120 DATA
264,56,124,246,254,246,246,246,0,272,252,230,252,230,254,254,
252,0,280,126,224,224,224,254,254,126,0

```

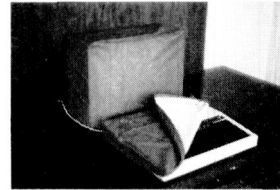


# PROGRAM FILE

# MICROMART

## PERSONALISED COMPUTER COVERS

These NEW products are available NOW on a  
**SPECIAL INTRODUCTORY OFFER**  
Protect your keyboard and VDU with these practical  
and attractive dust covers for as little as **£6.95!**



- ★ In durable and easy-to-clean leathercloth
- ★ Available to fit all leading makes of computer
- ★ This special offer includes the computer cover complete with your own initials

### Send as follows:

Your full name and address.  
Make and model of your keyboard and VDU.  
The initials to be displayed on your cover.  
Cheque/PO payable to **South Yorkshire (Promotions) Ltd, PO Box 5, Barnsley, South Yorkshire S70 1HD.**  
Add 50p p&p. Allow 10 days for delivery.

## MAINS SURGE

### CAUSES EXTENSIVE DAMAGE

Are your computers, printers, disc drives and televisions yet protected?

Our household suppressor is the one you are looking for, at only half the average price of other makes.

It has twin outlets, 2 amp/500 watt (total load) and comes complete with plug.

**ONLY £9.95**

+ £1.43 p&p

Cheques or P.O. made payable to

**ESSTONE ELECTRICAL**

UNIT 8, BALFIELD ROAD, PORTHLEVEN,  
CORNWALL TR15 9BQ

ALLOW 28 DAYS FOR DELIVERY

## DISK FORMAT TRANSLATION SERVICE

Data and programs transferred between different disk formats. Most formats possible. Charge £6.50 per disk.

## PUBLIC DOMAIN SOFTWARE DISK LIBRARY FOR CP/M

300+ volumes, everything from games to complete languages £1.50 per volume copy fee (10+ vols).

SAE or phone for details

**SPECTRONICS**

138 Holtze Rd, East Grinstead  
Sussex RH19 3EA  
Tel: (0342) 313883

```
1130 DATA
288,248,236,230,254,254,252,248,0,296,254,224,252,224,254,254
,254,0,304,254,224,252,240,240,240,240,0
1140 DATA
312,126,224,238,226,254,254,126,0,320,246,246,254,246,246,246
,246,0,328,124,124,0,124,124,124,124,0
1150 DATA
336,62,28,28,220,220,252,120,0,344,206,220,248,252,222,222,22
2,0,352,224,224,224,224,254,254,254,0
1160 DATA
360,198,238,254,254,238,238,238,0,368,230,246,254,254,254,238
,238,0,376,124,238,238,238,254,254,124,0
1170 DATA
384,252,238,238,252,240,240,240,0,392,124,238,238,238,254,124
,30,0,400,252,198,254,252,222,222,222,0
1180 DATA
408,126,224,124,6,254,254,252,0,416,254,124,124,124,124,124,1
24,0,424,246,246,246,246,254,254,124,0
1190 DATA
432,246,246,246,254,124,56,16,0,440,238,238,238,254,254,238,1
98,0,448,246,246,254,124,254,246,246,0
1200 DATA
456,238,238,124,56,124,124,124,0,464,254,30,60,120,254,254,25
4,0
2000 DIM Y$(21):Y$="Y[INV]A[INV]h[INV]t[INV]z[INV]E[INV]e
[INV]BY[INV] [INV]ken hall[INV]":X=1:GRAPHICS 18:POKE
756,Q/256:FOR I=19 TO 1 STEP -1:POSITION I,6
2010 ? #6;Y$(1,X):SOUND 0,50,10,10:X=X+1:FOR W=1 TO 25:NEXT
W:SOUND 0,0,0,0:FOR W=1 TO 15:NEXT W:NEXT I
4040 FOR W=1 TO 2000:NEXT W
4050 GRAPHICS 0:POKE 710,18:POKE 712,178:POKE 752,1
4055 ? " ***[INV] YAHTZEE [INV]***":? :? "A dice
game for up to four players"
4060 ? "All five dice can be rolled three times.Any dice
can be held while the others are";
4070 ? " rolled .Positions score -":? "1 to 6=Face value of
number selected"
4080 ? "3 KIND=3 the same-Face value scores":? "4 KIND=4 the
same-Face value scores"
4090 ? "F HOUSE=3 and 2 of any dice-Scores 25":? "S
STRT=1234,2345 or 3456-Scores 30"
4100 ? "L STRT=12345 or 23456-Scores 40":? "YAHTZEE=5 of any
dice-Scores 50"
4110 ? "CHANCE=Scores face value of all dice":? "If TOP TOTAL
is 63 or over a BONUS of 35 given .";
4120 ? " EXTRA YAHTZEEs may be put in any of the LOWER
positions . It scores 50 PLUS the position score."
4130 ? "Press numbers to HOLD dice,Press HOLD again to change
back dice.Press [INV]O[INV] to re-roll.";
4140 ? "Use Joystick to select score position and TRIGGER to
enter score."
4150 ? :? " ***[INV] LOADING PART TWO [INV]***";
5050 POKE 764,12:CLOAD
```

```
30 GOTO 2000
40 FOR GO=1 TO 13:FOR PG=1 TO PL
60 Y=2:FOR J=1 TO 5:FOR L=0 TO 15 STEP 0.5:SOUND
0,100,10,L:NEXT L:POSITION X(PG)-5,Y:? "*" :FOR L=15 TO 0
STEP -1
65 SOUND 0,100,10,L:NEXT L:POSITION X(PG)-5,Y:?
"[INV]*[INV]":NEXT J:FOR TH=1 TO 3:POSITION 20,0:? "PUSH
trigg TO THROW";
80 IF STRIG(0)=1 THEN 80
90 GOSUB 300:FOR I=1 TO 9 STEP 2:IF DH(I)=0 THEN
D(I)=INT(RND(0)*6+1):RS$(I,I)=CHR$(D(I)+48)
95 NEXT I:GOSUB 400:IF TH=3 THEN 120
100 POSITION 20,0:? ";0 or hold 1-2-3-4-5";GOTO 1300
110 IF DH(1)=1 AND DH(3)=1 AND DH(5)=1 AND DH(7)=1 AND
DH(9)=1 THEN POP :GOTO 120
115 NEXT TH
120 POSITION 20,0:? ";select THEN trigger";
130 S=STICK(0):IF STRIG(0)=0 THEN 500
135 IF S=15 THEN 130
```



## OUR PRICES ARE LOW, OUR DISCOUNT CLUB IS EVEN LOWER

Atari ST Range Amstrad 664	PHONE FOR DETAILS	NORMAL PRICE	DISCOUNT PRICE
BBC B		£299	£295
BBC B + DFS		£365	£360
Acorn 6502 (second proc.)		£176	£173
Acorn 280 (second proc.)		£339	£335
Torch 280 (second proc.)		£275	£270
Enterprise 64K comp		£217	£212
Amstrad 464 colour		£300	£295
Amstrad 464 green		£207	£203
Amstrad DDI disk		£169	£165
5 1/4" 100K 401 SS		£86	£82
5 1/4" 400K 40/80T. DS dual plus monitor stand		£320	£315
Canon PW 1080A NLQ		£285	£280
Juki 6100 Daisywheel		£325	£320
Philips 7502 green		£74	£70
Philips 7002 Colour TV/Mon		£196	£192

Carriage typically £4.00 or less, add 15% VAT to total.  
We carry most leading brand names.  
Many other services, repairs etc. For more information on how to get the full  
discount prices and our monthly price list, write or telephone.

**K.E.C.M.**  
8 WESTWOOD LANE,  
WELLING, KENT DA16 2HE  
Telephone: 01-301 3745  
CALLERS BY APPOINTMENT

## INSURE YOUR COMPUTER

Impact damage, Fire & Theft insurance for your  
Computer Equipment

For up to £3,000 cover..... £18 pa  
For £3,000 to £5,000 cover..... £30  
For £10,000 cover..... £50

FOR DETAILS:

**K.G.J. Insurance Brokers Ltd**  
6 Hagley Road, STOURBRIDGE, West Midlands  
DY8 1QG  
Tel: (0384) 390909

## EPSON

COMPUTER AND PRINTER  
REPAIRS AND SALES

**Tel: 01-968 8622**

APPROVED EPSON SERVICE CENTRE

Terrific prices on all printers

We do have a same day service if  
you bring your printer to us. Easy free  
parking.

Or if you prefer we will come to you,  
fast — on an emergency call out or a  
cheap rate annual maintenance con-  
tract.

Distributors and dealers — we pro-  
vide a special service for you.

ALL ENQUIRIES WELCOME

## LOGIFIX LTD

HORMEAD WHARF, HORMEAD ROAD  
PADDINGTON, LONDON W9

Evening and weekend collections possible

# PROGRAM FILE

```

140 POSITION X(PG)-5,Y:?" ":IF S=13 THEN Y=Y+1:IF Y>17 THEN
Y=2
150 IF S=14 THEN Y=Y-1:IF Y<2 THEN Y=17
160 POSITION X(PG)-5,Y:?" "[INV]*[INV]":SOUND 0,50,10,10:FOR
W=1 TO 20:NEXT W:SOUND 0,0,0,0:FOR W=1 TO 20:NEXT W
170 GOTO 130
180 POSITION 0,0:?" "":FOR I=1 TO 9 STEP
2:DH(I)=0:NEXT I
190 NEXT PG
200 NEXT GO
210 GOTO 1800
300 K=0:FOR RO=1 TO 7:FOR I=1 TO 9 STEP 2:K=K+1:IF K>6 THEN
K=1
310 IF DH(I)=0 THEN POSITION 9+I,0:?" CHR$(R(K))
340 FOR L=15 TO 5 STEP 0.5:SOUND 0,I+10*K,10,L:NEXT L:SOUND
0,0,0,0:FOR W=1 TO 3:NEXT W:NEXT I:NEXT RO:RETURN
400 FOR I=1 TO 9 STEP 2:IF DH(I)=0 THEN POSITION I+9,0:?"
CHR$(D(I)+131)
420 NEXT I:IF D(1)=D(3) AND D(1)=D(5) AND D(1)=D(7) AND
D(1)=D(9) THEN POP :GOSUB 1200:GOTO 1230
430 RETURN
500 IF Y>7 AND Y<11 THEN POSITION 20,0:?" #6;" INVALID
SELECTION":GOTO 905
505 FOR I=1 TO 4:FOR D=1 TO 7 STEP
2:AS$=RS$(D,D):BS$=RS$(D+2,D+2)
510 IF RS$(D+2,D+2)<RS$(D,D) THEN
RS$(D+2,D+2)=AS$:RS$(D,D)=BS$
520 NEXT D:NEXT I
530
A=ASC(RS$(1))-48:B=ASC(RS$(3))-48:C=ASC(RS$(5))-48:D=ASC(RS$(
7))-48:E=ASC(RS$(9))-48
540 SC=0:P(Y,PG)=P(Y,PG)+1:IF P(Y,PG)>1 THEN 900
550 IF Y>=2 AND Y<=7 THEN W=Y-1:GOTO 800
555 IF YS=1 THEN YZ=0
560 IF Y=11 THEN IF YZ=50 THEN 700
570 IF Y=11 THEN IF (A=B AND A=C) OR (B=C AND B=D) OR (C=D
AND C=E) THEN SC=A+B+C+D+E:GOTO 670
580 IF Y=12 THEN IF YZ=50 THEN 700
590 IF Y=12 THEN IF (A=B AND A=C AND A=D) OR (B=C AND B=D AND
B=E) THEN SC=A+B+C+D+E:GOTO 670
600 IF Y=13 THEN IF YZ=50 THEN SC=75:GOTO 670
610 IF Y=13 THEN IF (A=B AND A=C AND D=E) OR (A=B AND C=D AND
C=E) THEN SC=25:GOTO 670
620 IF Y=14 THEN IF YZ=50 THEN SC=80:GOTO 670
630 IF Y=14 THEN IF (A+B+C+D=A*4+6) OR (A+C+D+E=A*4+6) OR
(A+B+C+E=A*4+6) THEN SC=30:GOTO 670
635 IF Y=15 THEN IF YZ=50 THEN SC=90:GOTO 670
640 IF Y=15 THEN IF A+B+C+D+E=A*5+10 THEN SC=40:GOTO 670
650 IF Y=16 THEN IF (A+B+C+D+E)/5=A THEN SC=50:GOTO 670
655 IF Y=16 THEN IF (A+B+C+D+E)/5<>A THEN YS=1:SC=0:GOTO 670
660 IF Y=17 THEN SC=A+B+C+D+E+YZ
670 IF SC>9 THEN POSITION X(PG)-1,Y:?" SC:GOTO 680
675 POSITION X(PG)-1,Y:?" SC
680 LSC(PG)=LSC(PG)+SC:POSITION X(PG)-1,19:?" ;LSC(PG)
690 POSITION X(PG)-5,Y:?" "":TSC(PG)=USC(PG)+LSC(PG):POSITION
X(PG)-1,21:?" ;TSC(PG):SC=0:YZ=0:GOTO 180
700 SC=YZ+A+B+C+D+E:GOTO 670
800 FOR I=1 TO 9 STEP 2
810 IF D(I)=W THEN SC=SC+W
820 NEXT I:IF SC<10 THEN POSITION X(PG),Y:?" ;SC:GOTO 840
830 POSITION X(PG)-1,Y:?" ;SC
840 USC(PG)=USC(PG)+SC:IF USC(PG)>62 AND B(PG)=0 THEN
USC(PG)=USC(PG)+35:B(PG)=1
850 POSITION X(PG)-1,9:?" ;USC(PG):SC=0:GOTO 690
900 POSITION 20,0:?" "":POSITION FILLED "":
905 RESTORE 920:FOR I=1 TO 10:READ N:SOUND 0,N,10,10:FOR W=1
TO 25:NEXT W
910 NEXT I:SOUND 0,0,0,0:FOR W=1 TO 200:NEXT W:GOTO 120
920 DATA 91,0,121,128,121,108,121,0,96,91
1200 RESTORE 1220:FOR I=1 TO 14:READ N,W:SOUND 0,N,10,10:FOR
S=1 TO 3*W/16:NEXT S
1210 SOUND 0,N,10,5:FOR S=1 TO W/16:NEXT S:SOUND 0,0,0,0:NEXT
I:RETURN
1220 DATA
186,30,140,30,110,40,92,30,92,30,92,30,110,30,110,30,110,30,1
40,30,110,30,140,30,186,120,0,50
1230 YZ=50:POSITION 20,0:?" #6;"":FOR R=1

```



# PROGRAM FILE

# MICROMART

**Top quality  
USA made  
diskettes  
at unbeatable  
prices**

5 1/4" DISK	1-4 BOXES EACH	5-9 BOXES EACH	10+ BOXES EACH
DESCRIPTION	EX VAT	EX VAT	EX VAT
Single Sided DD 40 Tracks, 48tpi	11.50	10.50	9.50
Double Sided DD 40 Tracks, 48tpi	16.00	15.00	13.50
Single Sided Quad D 80 Tracks, 96tpi	16.90	15.90	14.90
Double Sided Quad D 80 Tracks, 96tpi	18.90	17.90	16.90
Packing & Postage	75p per box	FREE	

The quality of our diskettes is similar to those as used in most Top Range Software packages, for example SYMPHONY™, FRAMEWORK™, LOTUS 1-2-3™, and many others.

All our diskettes come with hub ring sleeve, write protect and library labels.

How can we offer them so inexpensively to you?

The reasons are simple.

1) We have an exclusive sourcing deal with a major US supplier.

2) We give you fully safe, no frills packaging.

AT KAMBAL, WE TAKE PRIDE IN GIVING YOU THE BEST DEAL AND THE BEST SERVICE.

Special discounts for Government and Education authorities on 8", 5 1/4" and 3 1/2" diskettes.  
Dealer Enquiries welcome — Special Discounts Available. Access/Visa/Amex/Cheque/COD.  
Dial-a-Disk Now: 01-631 1213; 01-636 4441; 01-637 3970.



**Kambal Data Systems**

SERVICE · VALUE · QUALITY · COURTESY  
5 Hanson Street, London  
W1P 7LJ  
Telex: 896559



**DATABASE  
PROGRAMMING**

**d Base II/d Base III  
Informix & C  
Sensible Solution**

Regd. Trademarks · Ashton Tate. RDS Inc. O'Hanlon Systems

**01 874 1898**

15 FULLERTON ROAD LONDON SW18 1BU

· APPLICATIONS · TRAINING · SUPPORT ·

JUNE 1985 PCW 253

```

• TO 7:POSITION 26,0:?:Y$(1,R):SOUND 0,50,10,10
1240 FOR W=1 TO 25:NEXT W:SOUND 0,0,0,0:FOR W=1 TO 10:NEXT
• W:NEXT R
1250 FOR II=1 TO 5:FOR I=0 TO 15:SOUND 0,35,4,I:FOR W=1 TO
• 2:NEXT W:POKE 708,I:NEXT I
1260 FOR I=15 TO 0 STEP -1:SOUND 0,35,4,I:FOR W=1 TO 2:NEXT
• W:POKE 708,I:NEXT I:NEXT II:POKE 708,40
1270 FOR W=1 TO 200:NEXT W:GOTO 120
• 1300 PK=PEEK(764):IF PK=50 THEN POKE 764,255:GOTO 110
1310 IF PK=31 AND DH(1)=0 THEN DH(1)=1:DP=21:M=D(1):GOTO 1500
• 1320 IF PK=31 AND DH(1)=1 THEN DH(1)=0:DP=21:M=D(1):GOTO 1600
1330 IF PK=30 AND DH(3)=0 THEN DH(3)=1:DP=23:M=D(3):GOTO 1500
• 1340 IF PK=30 AND DH(3)=1 THEN DH(3)=0:DP=23:M=D(3):GOTO 1600
1350 IF PK=26 AND DH(5)=0 THEN DH(5)=1:DP=25:M=D(5):GOTO 1500
• 1360 IF PK=26 AND DH(5)=1 THEN DH(5)=0:DP=25:M=D(5):GOTO 1600
1370 IF PK=24 AND DH(7)=0 THEN DH(7)=1:DP=27:M=D(7):GOTO 1500
• 1380 IF PK=24 AND DH(7)=1 THEN DH(7)=0:DP=27:M=D(7):GOTO 1600
1390 IF PK=29 AND DH(9)=0 THEN DH(9)=1:DP=29:M=D(9):GOTO 1500
• 1400 IF PK=29 AND DH(9)=1 THEN DH(9)=0:DP=29:M=D(9):GOTO 1600
1410 GOTO 1300
• 1500 POKE 764,255:POSITION 20,0:?:;"
":N=200:POSITION DP-11,0:?:;" "
1510 FOR I=8 TO 0 STEP -1:SOUND 0,N,10,10:POSITION DP+I,0:?:
• CHR$(M+3):;" ":N=N-10:FOR W=1 TO 10:NEXT W
1520 SOUND 0,0,0,0:FOR W=1 TO 5:NEXT W:NEXT I:POSITION
• DP+I,0:?:;" ":POSITION DP-21,0:?:CHR$(M+3):GOTO 100
1600 POKE 764,255:POSITION 20,0:?:;"
":N=80:POSITION DP-21,0:?:;" "
1610 FOR I=0 TO 7:SOUND 0,N,10,10:POSITION DP+I,0:?:;"
• ":CHR$(M+131):N=N+10:FOR W=1 TO 10:NEXT W:SOUND 0,0,0,0
1620 FOR W=1 TO 5:NEXT W:NEXT I:POSITION DP+I,0:?:;"
• ":POSITION DP-11,0:?:CHR$(M+131):GOTO 100
1800 IF TSC(1)>TSC(2) AND TSC(1)>TSC(3) AND TSC(1)>TSC(4)
• THEN M$=A$:GOTO 1840
1810 IF TSC(2)>TSC(1) AND TSC(2)>TSC(3) AND TSC(2)>TSC(4)
• THEN M$=B$:GOTO 1840
1820 IF TSC(3)>TSC(1) AND TSC(3)>TSC(2) AND TSC(3)>TSC(4)
• THEN M$=C$:GOTO 1840
1830 IF TSC(4)>TSC(1) AND TSC(4)>TSC(2) AND TSC(4)>TSC(3)
• THEN M$=D$
1840 GOSUB 1200:POSITION 0,0:?:"[INV]winner[INV] is
• ";M$:POSITION 20,0:?:;"PRESS ANY key TO GO"
1850 IF PEEK(764)=255 THEN 1850
1860 POKE 764,255:GOTO 2020
2000 DIM
• A$(6),B$(6),C$(6),D$(6),M$(6),USC(4),LSC(4),TSC(4),Y(4),X(4),
DH(9),D(9),R(6),B(4),Y$(7)
2005
• R(1)=132:R(2)=133:R(3)=134:R(4)=135:R(5)=136:R(6)=137:Q=(PEEK
(106)-8)*256:Y$="YAHTZEE"
2010 DIM
• P(17,4),RS$(9),A$(1),B$(1):X(1)=16:X(2)=23:X(3)=30:X(4)=37:
X=2
2020 GRAPHICS 0:POKE 756,Q/256:POKE 710,0:POKE 752,1:POSITION
• 14,1:?"[INV] Y A H T Z E E [INV]":POSITION 14,2
2030 ? "[INV] [INV]":POSITION 14,0:?"[INV]
• [INV]":POSITION 5,5:?"HOW MANY PLAYERS - PRESS 1 TO 4"
2060 PK=PEEK(764):IF PK=31 THEN PL=1:GOTO 2120
2070 IF PK=30 THEN PL=2:GOTO 2120
• 2080 IF PK=26 THEN PL=3:GOTO 2120
2090 IF PK=24 THEN PL=4:GOTO 2120
• 2100 GOTO 2060
2120 POKE 764,255:FOR I=1 TO PL:POSITION 3,5:?"PLAYER ";I;"
• TYPE YOUR NAME IN NOT MORE";
2130 POSITION 3,7:?"THAN SIX LETTERs ,THEN PRESS RETURN"
2140 IF I=1 THEN POSITION 3,11:?" PLAYER 1 = ":"INPUT A$
• 2150 IF I=2 THEN POSITION 3,13:?" PLAYER 2 = ":"INPUT B$
2160 IF I=3 THEN POSITION 3,15:?" PLAYER 3 = ":"INPUT C$
• 2170 IF I=4 THEN POSITION 3,17:?" PLAYER 4 = ":"INPUT D$
2180 NEXT I:POSITION 15,21:?"[INV] GOOD LUCK [INV]":POSITION
• 15,20:?"[INV] [INV]":POSITION 15,22:?"[INV]
[INV]"
2500 FOR W=1 TO 300:NEXT W:?" CHR$(125):POKE 712,66:POKE
• 710,16:POKE 711,12
2510 POKE 752,1:DL=PEEK(560)+PEEK(561)*256:POKE
• DL+3,64+7+128:POKE DL+6,7:GOSUB 6000:POKE 54286,192
2600 FOR I=1 TO 9 STEP 2:DH(I)=0:NEXT I:FOR I=1 TO
• 4:B(I)=0:USC(I)=0:LSC(I)=0:TSC(I)=0:NEXT I:FOR Y=2 TO 17
2605 FOR PG=1 TO 4:P(Y,PG)=0:NEXT PG:NEXT Y:YS=0
• 2610 POSITION 1,2:?"3 ONES":POSITION 1,3:?"3 TWOS":POSITION

```



# MICROMART

## SPECIAL OFFER

**Datalife  
disks at  
unbelievable  
prices!!!**

**15% OFF already LOW  
prices until 30th June 1985**  
Write or phone NOW for Offer details  
and Special Order form.



CONWAY COMPUTER SERVICES LTD  
39 CONWAY RD - LONDON - N15 3BB  
Tel: (01) 800-1796 (01) 802-1007  
Data Processing Supplies & Peripherals

## Budget Typesetting from your computer

Our customers have been typesetting  
books, magazines, brochures, ads and  
database files on their micros. Now they use

### TYPENET

The on-line complete typesetting system  
operating 24 hours a day, every day.  
**Why don't you join them and find out  
how you can save time and money?**

RING **01-658 6942** 300 BAUD  
or send for your info pack:

LONDON, GLC & WEST OTHER AREAS  
**15 Clock House Rd 1 The Esplanade**  
**Beckenham, Kent Rochester Kent**  
**01-658 8754 0634 41878**  
Telecom Gold 83: BTL001

## PROGRAMMING THE COMMODORE 64

Raeto West

Programming  
the  
COMMODORE  
64

The Definitive Guide  
Raeto Colin West  
The encyclopedic reference guide  
to the Commodore 64 computer.  
A Level Ltd. Publication

The reference encyclopedia for  
Commodore 64 users. Comprehensive  
teaching and reference book — deals  
in unparalleled depth with Basic,  
machine-language, 64 architecture,  
sound, graphics, tape, disks,  
hardware, etc.

17 chapters + appendices. 624 pages.  
Over 100 programs from book  
available on disk and as a 2-tape pack:  
save hours of keying-in.

From dealers and booksellers, or by  
direct mail.

**PROGRAMMING THE COMMODORE 64 (WEST, 1985).**

£14.90 (+£1 postage). ISBN 0 9507650 2 3.

**PROGRAMMING THE COMMODORE 64 DISK PACK.**

£8.90 (+50p postage; incs VAT). ISBN 0 9507650 3 1.

**PROGRAMMING THE COMMODORE 64 TWO-TAPE PACK.**

£9.90 (+50p postage; incs VAT). ISBN 0 9507650 1 X.

Also available:-

**PROGRAMMING THE VIC (WEST, 1984).**

£10.90 (+£1 postage). ISBN 0 9507650 1 5.

**PROGRAMMING THE PET/IBM (WEST, 1982).**

£18.90 (+£1 postage). ISBN 0 9507650 0 7.

Published by: Level Ltd (Computer Publications)

PO Box 438, Hampstead, London NW3 1BH

Tel: (01) 794-7241

Send cheque with order to our distributors:

Level Ltd, c/o Biblios Distribution Ltd, Star Road,

Partridge Green, Nr. Horsham, W. Sussex RH13 8LD

Tel: (0403) 710971

# PROGRAM FILE

```

• 1,4:? "3 THREES":POSITION 1,5:? "3 FOURS"
2620 POSITION 1,6:? "3 FIVES":POSITION 1,7:? "3
• SIXS":POSITION 1,9:? "TOP TOTAL"
2630 POSITION 1,11:? "3 OFA KIND":POSITION 1,12:? "4 OFA
• KIND":POSITION 1,13:? "FULL HOUSE":POSITION 1,14
2640 ? "3 STRAIGHT":POSITION 1,15:? "L STRAIGHT":POSITION
• 1,16:? "YAHTZEE":POSITION 1,17:? "CHANCE"
2660 POSITION 1,19:? "BOT TOTAL":POSITION 1,21:? "FULL
• TOTAL":POSITION X(1)-4,1:? ;A$
2700 FOR I=1 TO PL:POSITION X(I)-4,2:? "1s=":POSITION
• X(I)-4,3:? "2s="
2710 POSITION X(I)-4,4:? "3s=":POSITION X(I)-4,5:?
• "4s=":POSITION X(I)-4,6:? "5s=":POSITION X(I)-4,7:? "6s="
2720 POSITION X(I)-4,9:? "TT=":POSITION X(I)-4,11:?
• "3K=":POSITION X(I)-4,12:? "4K="
2730 POSITION X(I)-4,13:? "FH=":POSITION X(I)-4,14:?
• "SS=":POSITION X(I)-4,15:? "LS="
2740 POSITION X(I)-4,16:? "YZ=":POSITION X(I)-4,17:?
• "CH=":POSITION X(I)-4,19:? "BT="
2750 IF I=2 THEN POSITION X(I)-4,1:? ;B$
• 2760 IF I=3 THEN POSITION X(I)-4,1:? ;C$
2770 IF I=4 THEN POSITION X(I)-4,1:? ;D$
• 2780 POSITION X(I)-4,21:? "FT=":NEXT I:GOTO 40
6000 RESTORE 4050:FOR I=0 TO 10:READ C:POKE 1536+I,C:NEXT I
• 6010 POKE 512,0:POKE 513,6
6020 RETURN
• 6050 DATA 72,169,178,141,10,212,141,26,208,104,64
    
```



## Enterprise Analogue Clock

by E de Jons

Analogue Clock is a short utility for the enter the current hours, minutes and  
Enterprise 64. The program puts an seconds. After this has been entered, a  
analogue clock on the screen complete real-time clock will be displayed with a  
with hour, minutes and sweep second digital one underneath. To terminate,  
hand. When run, you will be asked to use the BREAK key.

```

• 100 PROGRAM "analogue_clock"
110 TEXT
120 SET BORDER 40
130 SET #102:PALETTE 40,70,83,83
140 INPUT AT 10,6,PROMPT "Number of hours ? (1-23) ":H$
• 150 LET AU=INT(ABS(AU)):LET AU$=""
160 IF AU<0 OR AU>23 THEN 140
170 IF AU<10 THEN LET AU$="0"
• 180 LET AU$=AU$&STR$(AU)
190 INPUT AT 12,6,PROMPT "Number of minutes ? (1-59) ":AM$
• 200 LET AM=INT(ABS(AM)):LET AM$=""
210 IF AM<0 OR AM>59 THEN 190
220 IF AM<10 THEN LET AM$="0"
• 230 LET AM$=AM$&STR$(AM)
240 INPUT AT 14,6,PROMPT "Number of seconds ? (1-59) ":AS$
• 250 LET AS=INT(ABS(AS)):LET AS$=""
260 IF AS<0 OR AS>59 THEN 240
270 IF AS<10 THEN LET AS$="0"
• 280 LET AS$=AS$&STR$(AS)
290 TIME AU$&" ":"AM$&" ":"AS$
300 OPTION ANGLE DEGREES
• 310 ENVELOPE NUMBER 110,63,63,110,-63,-63,69
320 SOUND ENVELOPE 1,PITCH 79.5,DURATION 70
330 SOUND ENVELOPE 1,PITCH 81,DURATION 70
• 340 SOUND ENVELOPE 1,PITCH 83,DURATION 70
350 SOUND ENVELOPE 1,PITCH 84,DURATION 70
• 360 SET VIDEO MODE 1
370 SET VIDEO COLOR 1
• 380 SET VIDEO X 30
390 SET VIDEO Y 25
• 400 OPEN #1:"video1"
410 SET VIDEO MODE 0
420 SET VIDEO COLOR 0
• 430 SET VIDEO X 8
440 SET VIDEO Y 2
• 450 OPEN #11:"video1"
460 SET #10:PALETTE 34,11,255,20
• 470 SET #11:PALETTE 81,255,81,81
480 SET #10:INK 2
• 490 PLOT #10:480,450,ELLIPSE 400,400,ELLIPSE 420,420,
500 SET #10:INK 1
• 510 PLOT #10:480,400,PAINT
520 SET #10:INK 3
• 530 PLOT #10:480,450,PAINT
540 DISPLAY #10:AT 1 FROM 1 TO 25
    
```



# PROGRAM FILE

```

550 DISPLAY #11:AT 26 FROM 1 TO 2
560 SET BORDER 81
570 SET STATUS OFF
580 SET #10:INK 2
590 FOR S=31 TO 361 STEP 30
600 LET X=370+SIN(S)*10 LET Y=370+COS(S)
610 LET S=STR$(S-1)/30
620 IF VAL(S)=10 THEN LET X=X-(VAL(S)-10)*15
630 IF VAL(S)=10 THEN LET X=X-10
640 PLOT #10:470+X,460+Y,
650 PRINT #10:S$
660 NEXT
670 LET UA=480:LET UB=450:LET MA=480:LET MB=450:LET SA=480:LET SB=450:LET S=0
680 LET MC=VAL(TIME$(4:5))*6
690 LET UP=VAL(TIME$(1:2))
700 IF UP>12 THEN LET UP=UP-12
710 IF UP=0 THEN LET UP=12
720 LET UC=UP*30+MC/12
730 LET MX=SIN(MC)*320+480:LET MY=COS(MC)*320+450
740 LET UX=SIN(UC)*250+480:LET UY=COS(UC)*250+450
750 LET SEC=VAL(TIME$(1:2)):LET SC=SEC*6
760 LET MC=VAL(TIME$(4:5))*6
770 LET UP=VAL(TIME$(1:2))
780 IF UP>12 THEN LET UP=UP-12
790 IF UP=0 THEN LET UP=12
800 LET UC=UP*30+MC/12
810 SET #10:INK 3
820 LET SX=SIN(SC)*320+480:LET SY=COS(SC)*320+450
830 IF SEC=0 THEN
840 LET MX=SIN(MC)*320+480:LET MY=COS(MC)*320+450
850 IF MC/90=INT(MC/90) THEN
860 LET UX=SIN(UC)*250+480:LET UY=COS(UC)*250+450
870 IF MC=0 AND SEC=0 THEN LET S=UP
880 PLOT #10:480,450:UA,UB
890 END IF
900 PLOT #10:480,450:MA,MB
910 END IF
920 PLOT #10:480,450:SA,SB
930 SET #10:INK 2
940 PLOT #10:480,450:MX,MY
950 SOUND PITCH 10,DURATION 1,SOURCE 1
960 PLOT #10:480,450:MX,MY
970 PLOT #10:480,450:UX,UY
980 PLOT #10:480,450,ELLIPSE 10,10
990 PRINT #11:CHR$(30):TIME$
1000 IF S>0 THEN
1010 SOUND ENVELOPE 1,PITCH 27,DURATION 70
1020 LET S=S-1
1030 END IF
1040 LET SA=SX:LET SB=SY
1050 LET MA=MX:LET MB=MY
1060 LET UA=UX:LET UB=UY
1070 DO
1080 LOOP WHILE SEC=VAL(TIME$(7:8))
1090 GOTO 750
1100 ! "© E. de Jons,Netherlands"

```

PCW is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs please include a cassette or disk version of your program, brief but comprehensive documentation, and a listing on plain white paper — typed if you have no printer.

Please ensure that the software itself, the documentation and the listing are all marked with your name, address, program title, machine (along with any minimum requirements) and — if possible — a daytime phone number.

All programs should be fully debugged and your own original, unpublished work.

We prefer to receive programs with a maximum 80-column width printed in emphasised typeface.

Please keep a copy of everything.

Programs are paid for at the rate of £50 per page of published listing, plus a £50 bonus for the Program of the Month. Send your contributions to Nick Walker, PCW Programs, 62 Oxford St, London W1A 2HG. **END**

# MICROMART

## 5 1/4" 3 1/2" & 3" DISCS

Bulk Packed by Memorex, Maxell, Nashua, Fuji, BASF or other major manufacturer depending on availability and disc type, prices from:

	100	2000	6000 +
5 1/4"SS/48 TPI	£0.89	£0.79	£0.69
5 1/4"DS/48 TPI	£1.22	£1.09	£0.95
5 1/4"DS/96 TPI	£1.66	£1.49	£1.29
	under 30	100	200 +
3 1/2"SS/DD	£3.38	£2.88	£2.48
3 1/2"DS/DD	£3.98	£3.48	£3.08
3" DS/DD	£3.52	£2.92	£2.72

The above prices are per disc, *do not* include VAT at 15% and may vary depending on brand required.

Delivery: £4.35 + VAT per order.

Please phone for further details —

**BOLTON WELLS LTD**

**01-435 7911**

**01-435 2411**

## AMSTRAD CPC 464

### UTILITY PROGRAMS FROM PRIDE

Always the first and the best software. Offering more features and better value for money than other similar programs available. We also offer a fast reliable and friendly mail-order service. No enquiry is ignored. SAE.

#### SYCLONE

Copy and/or convert your programs to load in up to four times faster.

Features include:

- \* Commands available from basic.
- \* Choice of four loading speeds, 1000 to 4000 baud.
- \* Comprehensive header reader
- \* Load and list protected basic programs
- \* List your "Welcome" tape. Cassette £6.95 inc. P&P

#### TRANSMAT

Transfer your programs onto the Amstrad Disc System.

Features include:

- \* Faithfully transfer all programs.
- \* Add relocater is necessary.
- \* Auto or non auto modes.
- \* Erase or rename programs.
- \* Comprehensive header reader.

Cassette £7.95 inc. P&P.

#### ZEDIS

A comprehensive machine code editor and disassembler.

Features include:

- \* Continual menu display.
- \* Break point insertion.
- \* Register inspection.
- \* High speed hex code/string search.
- \* Hex code/string input.

Instructions included to disassemble ROMs.  
Cassette £6.95 inc. P&P. Disc £10.95 inc. P&P.

#### PRINTERPAC1

A printer enhancement program for the DMP1 and Epson compatible printers.

Features include:

- \* Screen dump in all modes.
- \* Text dump in all modes.
- \* Two sizes of dump for Epson compatible printers.
- \* Three new type styles for the DMP1.
- \* Abbreviated codes to printer.

Cassette £5.95 inc. P&P. Disc £9.95 inc. P&P.

#### LOWER CASE DESCENDERS FOR THE DMP1 PRINTER

##### SCRIPTOR

A two program printer enhancement pack for the DMP1 printer.

This exciting new pack offers 6 new definable character fonts, included are: Real Writing, Italics, Futuristic, bold and heavy styles, plus, at last, LOWER CASE DESCENDERS and Amstrad or Tasword compatibility.

Cassette £6.95 inc. P&P  
Disk £10.95 inc. P&P

## SPECIAL OFFER

Worth £3.95

Buy more than one title and get a cassette containing a real time digital alarm clock FREE including its P&P (while stocks last)

Europe — add £1.00 per title, rest of world — add £1.50 per title.

\*\* All disc based titles have FREE disc space available to user \*\*

## PRIDE UTILITIES LTD (B)

7 CHALTON HEIGHTS, CHALTON,  
LUTON, BEDS LU49UF

CUSTOMER INQUIRIES

**0582411686** (9-10am)



Every computer needs  
**CHATTERBOX II**  
"Listen creep, I am the leader..."

For ZX81  
SPECTRUM  
BBC  
TRIS  
APPLE  
NASCOM  
VIC PET 64  
(Please state)

**NEW! EXCLUSIVE!** **PITCH CONTROL**

**CHATTERBOX II** can say anything!  
Genuine phoneme synthesis - not just recorded speech - hence unlimited vocabulary.  
Programmable pitch for more natural intonation (exclusive to Wm Stuart Systems) - solid tone cabinet for quality sound - integral beep music amplifier. **PLUS** expansion socket for BIG EARS voice recognition system. Full instructions, technical notes and software supplied with this outstanding educational unit.  
DEALER ENQUIRIES WELCOME

As seen on BBC TV "Computer Programme"

**\*BIG EARS\***  
SPEECH INPUT FOR ANY COMPUTER

Hugely successful Speech Recognition System complete with microphone software and full instructions

**BUILT TESTED & GUARANTEED**  
PLEASE STATE COMPUTER: UK101  
SPECTRUM, ATOM, NASCOM2, Vic 20, Micron  
ZX80 8+ PET TRS80 M280K APPLE II BBC MICRO, CBM 64

**ZX81/SPECTRUM** **NEW!**  
MUSIC SYNTHESIZER (Stereo)  
- 16 LINE CONTROL PORT

Play 3-part music, sound effects, drums etc. Full control of attack, decay and frequency.  
Input/Output lines provide control and monitor facility for Home Security, Robot Control, Model Railway etc. Works with or without 16K RAM.

Full instructions, software included.  
Add keyboard to make a live performance polyphonic synthesiser!  
Note: up to 3 units can be used simultaneously giving 9 music channels & 48 0 lines

**AMAZING VALUE AT ONLY**  
**£19.50 (KIT)**  
**£25.50 (BUILT)**

**SOFTWARE**

**THE COMPOSER**  
Synthesiser Music Programme.  
Enter & play 3 part harmony.  
Includes demonstrations.  
Spectrum ZX81 recommended £7

**TALKING HANGMAN**  
For Chatterbox.  
The classic game, claims its victims with a dry voice accompaniment. Spectrum £6

**ZX ARP/DRUMSEQ**  
Fascinating synthesiser demonstrations. Generates automatic sequences and plays from keyboard. Some weird effects. Spectrum £6

**CHROMACODE?????**  
Can you defuse the bomb by cracking the secret combination on before time runs out? With Chatterbox voice output. Spectrum £6

**COLOUR MODULATOR** KIT £16  
RGB in PAL UHF out (not for ZX81) BUILT £22

Please add VAT at 15% to prices.  
Barclay Access orders accepted by telephone

All enquiries S.A.E. please

**WILLIAM STUART SYSTEMS Ltd**  
Quarley Down House  
Chiddingfold  
Nr. Salisbury  
Wiltshire SP4 0DZ  
Tel: 098 064 235

## WANTED PERSONAL COMPUTERS

IBM, TANDY, EPSON, etc  
*all models bought for cash*

### MORGAN CAMERA COMPANY

179 Tottenham Court Road,  
London W1.  
Tel: 01-636 1138

## OPEN HOUSE TUITION FOR NOVICES AND OTHERS

Choose your time — day or evening. Learn at your own pace.  
BASIC programming £60  
BUSINESS Packages £70  
Word-Processing introduction £25  
30-hour introduction for small businesses £100  
Subject to MSC training grants

Brochure from:

### MICROCOMPUTER ADVISORY CENTRE

Polytechnic of the  
South Bank  
Borough Road  
London SE1 0AA

or ring:

01-928 8989 ext. 2468



### MICROMODS LTD

53 Acton Road  
Long Eaton  
Nottingham NG10 1FR  
Tel: 0602 724264

## O'LEVELS

not just revision but also tuition for the  
Spectrum 48K

MATHEMATICS	8 PROGRAMS
PHYSICS	7 PROGRAMS
BIOLOGY	6 PROGRAMS
COMPUTER ST.	8 PROGRAMS
CHEMISTRY	8 PROGRAMS
FRENCH	8 PROGRAMS
ELECTRONICS	8 PROGRAMS

Each of the programs in a set are divided into between 4 and 14 tutorial sections, making as many as 70 overall. Each section consists of a number of pages of instructive text and diagrams, followed by questions, which where possible are randomly generated.

As used in schools and colleges

Each subject only £12.95

### BORED WITH BASIC?

Teaching versions of Pascal and C languages, including a screen editor and 48 page tutorial manual. Trace facilities are provided for easy tuition and debugging

Each language only £7.95

### GCE TUTORING

40 BRIMMERS HILL, WIDMER END  
HIGH WYCOMBE, BUCKS HP15 6NP

## Colour Print you can afford!

**FREE**

The Nationwide brochure pack contains professional advice on writing sales copy, sales photography, and full details of 22 low cost items of colour print with 100's of variations at no extra charge.

GET INTO COLOUR FOR OLYMPIA!

Leaflets • Posters • Brochures  
• Showcards •

Phone for yours Today

**NATIONWIDE COLOUR LTD**

0621-54155

(24 hr Ansaphone service)

## JP Magnetics

SPECIALISTS IN THE SUPPLY OF BULK CUSTOM  
WOUND AUDIO/COMPUTER CASSETTES TO  
TRADE AND EDUCATION

NEW TURBO LOAD FOR CBM 64  
WITH 'ON SCREEN DISPLAY'

DUPLICATION FACILITIES FOR  
MOST POPULAR HOME COMPUTERS  
16 TRACK RECORDING STUDIO

COMPETITIVE RATES. CONTACT US FOR PRICE LIST/QUOTATIONS NOW

### JP MAGNETICS LTD

UNIT 4, 7 MARY ST, BRADFORD BD4 8SW  
TEL: (0274) 731651

## COMPUTER BOOKS MAIL ORDER

Quick delivery, lots of new titles

**FREE** send for our  
comprehensive list of computer  
books and software.

**Rickmansworth 779129**  
(24 hours)

Or write:

Computer Books Ltd.  
Freepost  
Rickmansworth  
Herts. WD3 6FP

Telephone orders ring Eileen or Josie  
Rickmansworth (0923) 777652

We aim to please so send off now



# CUB AND QL— THE PERFECT PARTNERSHIP

This Cub colour monitor is  
TOTALLY compatible with the  
Sinclair QL.

It combines outstanding  
graphics capabilities with the  
facility for displaying full 85  
column text whilst doing full  
justice to the colour potential  
of the QL. Its new cabinet  
with Tilt and Swivel Plinth  
harmonises perfectly with the  
QL's simple yet functional  
appearance.

Best of all, a price of only

£ **295**

**inc. V.A.T. and Tilt and  
Swivel Plinth** keeps your  
bank balance in the black too.

## SPECIFICATION

Model — CUB 1451/DQT3

14" QL monitor

RGB/TTL input

Tube Resolution (pixels) — 653 (H)

Pitch — 0.43 mm

Bandwidth — 18 MHz

Antiglare CRT



**MICROVITEC**  
**cub**  
**COLOUR MONITORS**

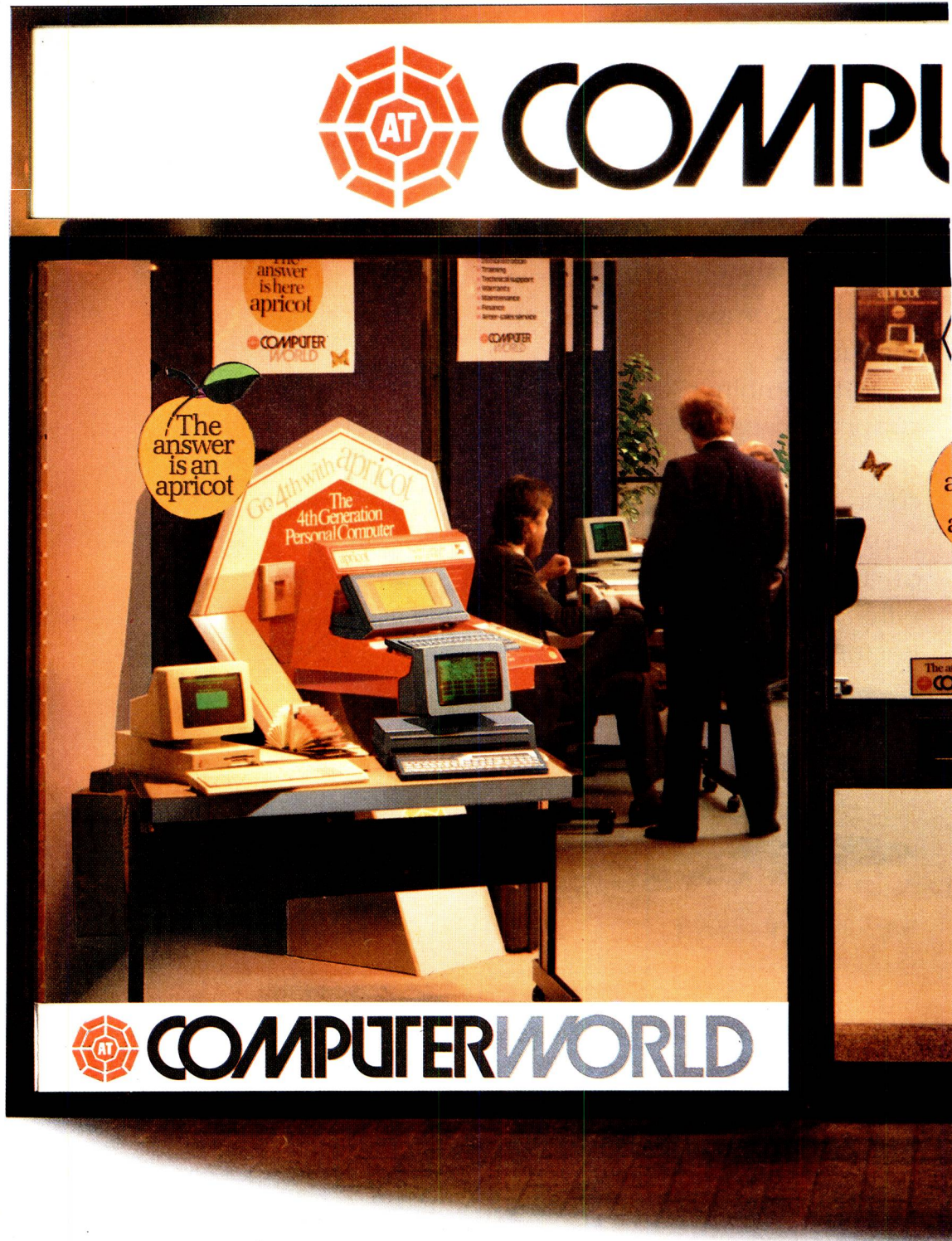
Microvitec plc., Futures Way, Bolling Road,  
Bradford, West Yorkshire BD4 7TU.  
Tel: (0274) 390011/726500. Telex: 517717

AVAILABLE FROM HIGH STREET COMPUTER RETAILERS AND BRANCHES OF W. H. SMITH, BOOTS, JOHN LEWIS PARTNERSHIP, LASKEYS, CURRYS.  
THE NAME 'CUB' IS A REGISTERED TRADE MARK OF MICROVITEC PLC.





# There's mo



The advertisement features a large photograph of a trade show booth for AT ComputerWorld. The booth is decorated with orange and white branding. A large sign in the background reads "The answer is here apricot" and "COMPUTER WORLD". A smaller sign on the left says "The answer is an apricot". A central display features a computer monitor and keyboard, with a sign above it that says "Go 4th with apricot The 4th Generation Personal Computer". Two people are visible in the background, one sitting at a desk and another standing. The AT logo, a stylized orange hexagon with "AT" inside, is prominently displayed at the top and bottom of the booth image.

**AT COMPUTERWORLD**

AT ComputerWorld – the UK's leading business computer chain – designed to help you and your business. With a pedigree like ours – we are a joint venture company owned by ACT (over 25,000 Apricots successfully installed) and the Tandy Corporation (the world's 3rd largest micro manufacturer) – you'd expect to find the best.

We don't think you'll be disappointed.

To find out how the superb Apricot and Tandy micro computers could benefit your business please join us at one of our major

customer seminars being held over the coming weeks. This nationwide programme of business events is designed to provide progressive companies with free professional advice as to the best choice of system for their particular needs. To obtain your COMPLIMENTARY tickets simply fill in the coupon and return it to us immediately. Numbers must be restricted – so don't delay.

If you can't make any of the seminars, please call into one of our ComputerWorld business centres. Our experienced consultants are always on hand to discuss your computing requirements



# in store at COMPUTERWORLD



**COMPLIMENTARY  
SEMINAR  
TICKETS**

## AT ComputerWorld Stores now open at:-

BIRMINGHAM	021-643 5368	LONDON EC2	01-283 9283
BRADFORD	0274-728431	LONDON WC2	01-836 1327
BRISTOL	0272-277104	LONDON NW1	01-388 8484
BRISTOL	0272-214721	LONDON EC4	01-248 5313
CAMBRIDGE	0223-664444	LONDON SW1	01-828 1423
CHELTENHAM	0242-515152	MANCHESTER	061-832 8322
CARDIFF	0222-45859	NEWCASTLE	0632-615161
COVENTRY	0203-23582	NORWICH	0603-612553
CRAWLEY	0293-543301	NOTTINGHAM	0602-412144
CROYDON	01-680 1852	READING	0734-508787
EDINBURGH	031-337 9870	SHEFFIELD	0742-752848
GLASGOW	041-221 8413	SHREWSBURY	0743-68167
HULL	0482-28811	SOUTHAMPTON	0703-336344
LEEDS	0532-433411	SWINDON	0793-762449
LEICESTER	0533-550661	TELFORD	0952-506664
LIVERPOOL	051-236 1112	WILMSLOW	0625-584727
LIVERPOOL	051-708 0133	WOLVERHAMPTON	0902-712121

Please send me details of a customer seminar at a venue near to me.

PCW 6/85

NAME: \_\_\_\_\_

POSITION: \_\_\_\_\_

COMPANY: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

TEL. NO. \_\_\_\_\_

Return To:  **COMPUTERWORLD**  
AT ComputerWorld Ltd., 43 Calthorpe Road, Edgbaston, Birmingham B15 1TS.  
Telephone: 021-455 8484.







# THE UNIQUE MSX SYSTEM

Buy an MSX computer and you'll invest in the future system of home computing. MSX is the standard operating system that offers complete compatibility between the best names in computer hardware and software. As technology advances, MSX will be the computer link that keeps you right in touch.

## Five page feature...

As Sony continue to develop the latest in high technology products for your home, they have chosen MSX as the operating system for all their home computing products. They believe that any product which relies on software (record players, tape recorders, video recorders and computers) should, in the interests of both the consumer and the manufacturer, utilise the best system as the industry standard.

### THE SENSATIONAL SONY HIT BIT



A 64K MSX Computer with an exclusive, built-in Personal Data Bank (firmware). This handy facility enables you to enter, store, recall and up-date all kinds of personal information such as appointments, addresses, telephone numbers, etc. Operation is simple, with instruc-

tions appearing on the screen every step of the process.

**£299.95**

**KV1430 14" MONITOR STYLE, PUSH BUTTON CONTROL TRINITRON COLOUR TELEVISION** with front mounted RF terminal.

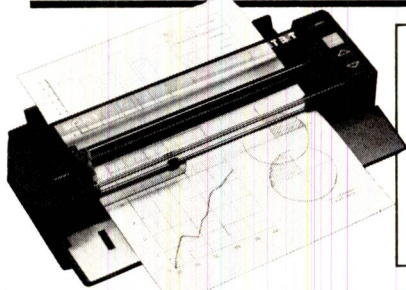
**£239.95**

**JS 75 REMOTE CONTROL JOYSTICK** Play fast-action games from a distance without the encumbrance of cables with this quick-response remote control joystick.

**£64.95**

**HBD50 MICRO FLOPPY-DISK UNIT** stores up to 360K bytes of information on a 3½" disk. Easily connected to the Hit Bit by using one of the expansion ports.

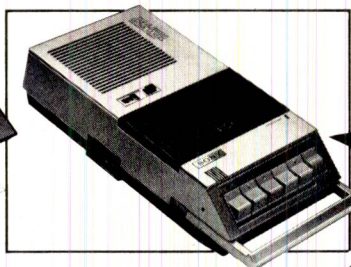
**£349.95**



#### PRN-C41 PLOTTER/PRINTER

This Plotter/Printer produces red, green, blue and black images and characters. Pen replacement is easy and it takes a wide choice of paper sizes. Including FREE 'greetings pack' software.

**£249.95**



#### TCM737 DATA RECORDER

A mains or battery operated recorder ideal for use with your home computer.

**£39.95**



Data from the Personal Data Bank can be saved on any data storage facility including the **UNIQUE HB155 RAM CARTRIDGE**, available for

**£39.95**

### DISK DRIVE OPTION

Upgrade any MSX computer for business applications with the addition of the Sony Disk Drive. Store up to 360k of information on each 3.5 inch disk and realise the fantastic potential of your MSX with this high speed data access facility.

**£349.95**

**JS55 JOYSTICK £19.95**

OR DETAILS OF YOUR NEAREST STOCKISTS AND OTHER MSX PRODUCTS, SEE FOLLOWING PAGES.

**AXIS**  
AT HOME WITH TECHNOLOGY

PRICES SHOWN INCLUDE VAT AND ARE CORRECT AT TIME OF GOING TO PRESS. E & O.E.



# THE UNIQUE MSX SYSTEM

The MSX system has been universally adopted by the major home electronics manufacturers. With the rapidly growing interest in the use of computers, each one

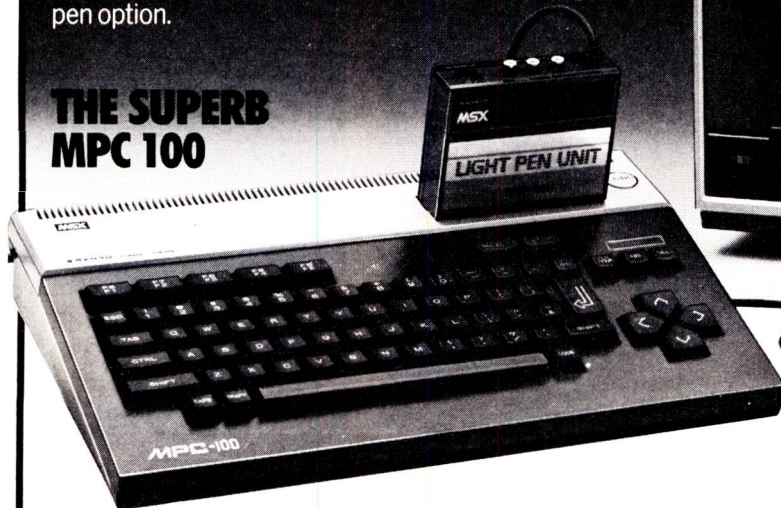
# ...Unbeatable



With direct involvement in the growing use of computers in industry, Sanyo recognise the fantastic potential of the computer in the home.

Drawing on their vast experience in the provision of popular home electronic products, Sanyo have selected the MSX system as the new standard and immediately taken advantage of the superb graphics capabilities with the introduction of their unique light pen option.

## THE SUPERB MPC 100



This sophisticated piece of equipment offers all the advantages of 64K MSX computing. (Complete with 4 programme starter pack.)

**£299.99**

Plus a unique optional feature –

**MLT001 LIGHT PEN** This provides you with unlimited flair and flexibility in colour graphics design. This feature comes complete with a software package containing some intriguing graphic facilities.

**£89.99**



## CTP 4132 16" TELETXT COLOUR TV MONITOR

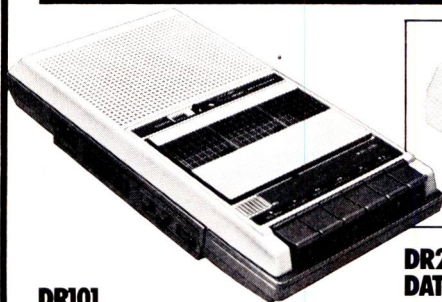
Advanced features include: black matrix 90° deflection tube, 30-function I.R. Remote Control, 8 programme tuning, AV terminals and Automatic Fine Tuning.

**£349.99**

## DR202 DATA RECORDER

Top of the range machine offering a host of high technology features.

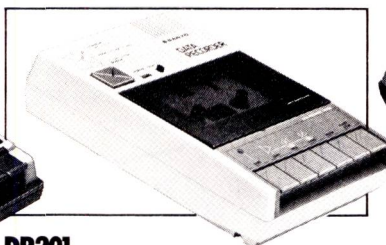
**£44.99**



### DR101

**RECORDER** Specifically designed for use with personal computers, with phase shift switch, speaker monitor and AC/DC operation.

**£34.99**



### DR201

**DATA RECORDER** An AC only recorder styled for computer use with all controls conveniently placed on top of the machine for ease of use.

**£34.99**

### JOYSTICK MJY 002

**£12.99**



## SPECIAL OFFER!

### SLIM 11 DATA RECORDER MJY 002 JOYSTICK

Plus special software pack.  
Total value over:

**£50.00**

**FREE!**

When you purchase the Sanyo MPC 100 Computer.

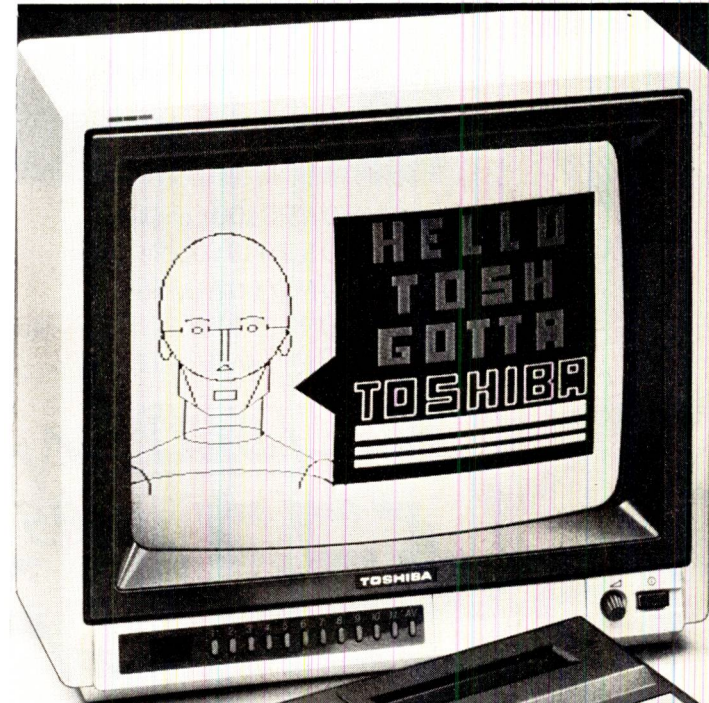


cognises the future potential of computer usage at home,  
for both entertainment and practical purposes.

That's why household names famous for superb

quality and value have selected MSX as the one system to  
become the computer industry standard. Axis bring you  
the best names in MSX at the best possible prices.

# quality & choice...



## THE STAR VALUE TOSHIBA HX10

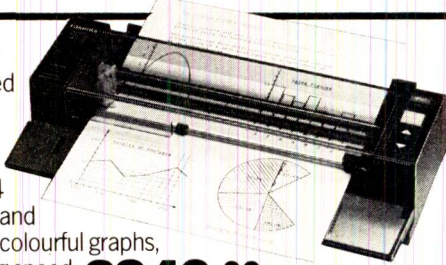
Offering superb facilities and  
outstanding value for the first time  
user or enthusiast. 64K Ram, 16  
colour graphics, RF, video and

audio connectors, plus ports for  
printer, disk drive and data recorder.  
**£279.95** (For money saving  
offer see panel)

### HX-P570 PLOTTER PRINTER

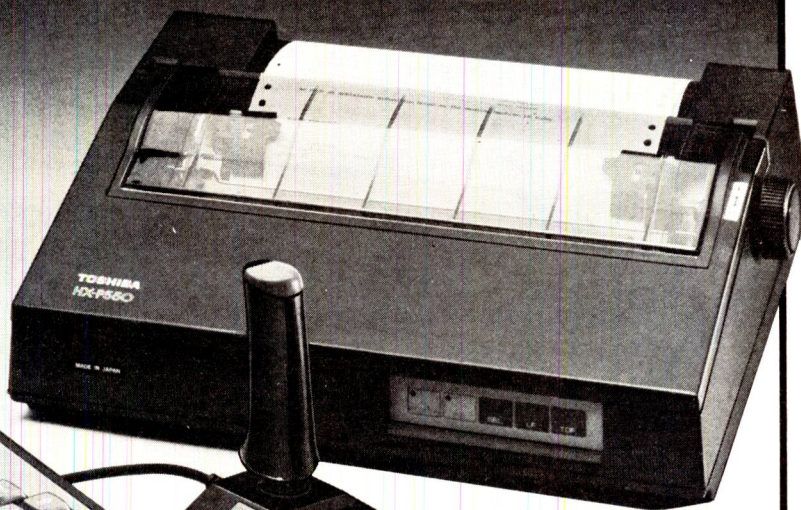
Easily connected  
to the HX10 through the  
printer interface. This  
printer features image  
and character plotting in 4  
colours – red, green, blue and  
black – making it ideal for colourful graphs,  
pie and bar charts. Plotting speed  
is 285 steps per second.

**£249.00**



## TOSHIBA

Toshiba were the first to  
introduce MSX into the UK  
market. With their years of  
experience and their firm  
commitment to the home electronics industry, Toshiba  
recognise the potential of the computer in the home and  
have selected MSX as the realistic standard to work to.



### HX-P550 HIGH SPEED DOT MATRIX PRINTER

Printing  
at 105 characters per  
second, for fast copies of all  
information, including graphics  
symbols. Ideal for word processing  
and programme  
listing.

**£349.00**

**HX-J400  
JOYSTICK  
£12.95**

### 140E MONITOR STYLE COLOUR TELEVISION

The perfect partner for the HX10, providing  
excellent picture and sound  
quality.

**£189.95**

# SAVE £40

off the normal Axis price of the Toshiba HX10 Computer

**PLUS 3 year guarantee**

**PLUS 3 Free software titles.**

**ALL FOR**

# £239.95

# AXIS

AT HOME WITH TECHNOLOGY

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.



# THE UNIQUE MSX SYSTEM

The MSX System allows the experienced computer user to select, from a wide range of peripherals, all they need for any particular

# ...Unbeatable

## SAVE OVER

**£100\*\***

## AXIS COMPLETE COMPUTING PACKAGE\*

- SANYO MPC 100 Computer
  - SANYO SLIM 10 Data Recorder
  - SANYO MJY 002 Joystick
  - SAMSUNG BT309K B/W TV Monitor
- PLUS** £35 worth of software

**ONLY**  
**£324.<sup>95</sup>**  
Normal Axis price £425.75

\*Offers available only while stocks last \*\*Axis Saving refers to previous advertised prices or recommended retail prices.

## JVC

JVC invented the 'VHS' format for video recorders, so are well aware of the advantages of standardization.

They forecast MSX as the worldwide home computing standard and they see the video compatibility of their MSX as a key development path into the future.

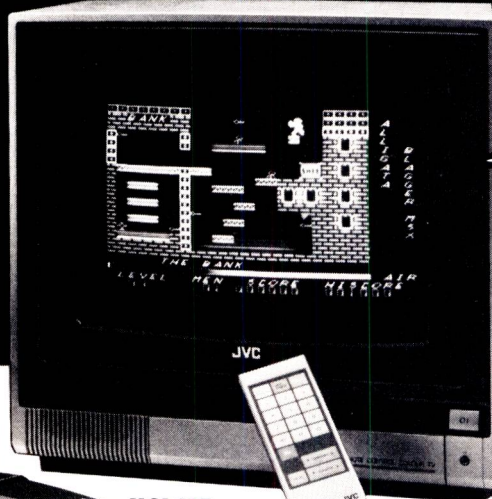
## THE SPECTACULAR HC-7GB



The HC-7GB personal computer from JVC is a new MSX machine designed for total compatibility between other MSX machines and all MSX software. A highly advanced 64K machine, the HC-7GB has three display modes offering RF, composite video and RGB outputs.

The HC-7GB MSX personal computer from JVC is the final word in home entertainment. **£279.00**

**7255 GB 14" COLOUR TV MONITOR** A fully remote controlled TV, ideal as a computer monitor or alone as a second TV. **£259.00**



**HCJ 615 JOYSTICK**  
**£12.95**

**HC-R105 DATA RECORDER** The stylish designed HC-R105 data recorder is an example of a machine produced to offer superb user

convenience, exceptional performance parameters and reliable data transfer. The HC-R105 is a high speed machine giving very short access times to data. **£89.00**

**FREE!**  
JVC SOFTWARE PACK  
WHEN YOU PURCHASE  
THE AMAZING HC-7GB  
COMPUTER



## "SPECIAL FOR VIDEO ENTHUSIASTS"

Add your own titles to your video films with the Character Generator included in the JVC free software pack.



application. But, in order to help those starting a new system, Axis have put together a special range of "Complete Package Deals" that contain everything

needed to start in computing.

These "Complete Package Deals" are available to you at exclusive and unbeatable Axis prices.

# package deals



## SAVE OVER

## £115\*\*

### AXIS COMPLETE COLOUR PACKAGE\*

- TOSHIBA HX10 Computer
- TOSHIBA 140E Colour TV Monitor
- TOSHIBA HX-J400 Joystick
- SANYO SLIM 10 Data Recorder

**PLUS** Assorted Software (value £9.95)

\*Offers available only while stocks last  
\*\*Savings refers to previous Axis advertised prices or recommended retail prices.

## ONLY £399.<sup>95</sup>

Normal Axis price £517.75

## AXIS BRINGS A GREAT DEAL TO THE INDEPENDENT DEALER

Axis is an organisation that brings you the best deals through your existing High Street dealer.

With an established reputation for personal service and care for their customers, Axis recommended dealers now bring you deals that no multiple can match.

Axis provide the resources to research and select high quality products and to make them available through the independent at unbeatable prices.

For "Exclusive Axis Deals" and the "Greatest Ever Care and Service", your nearest Axis recommended dealer is:

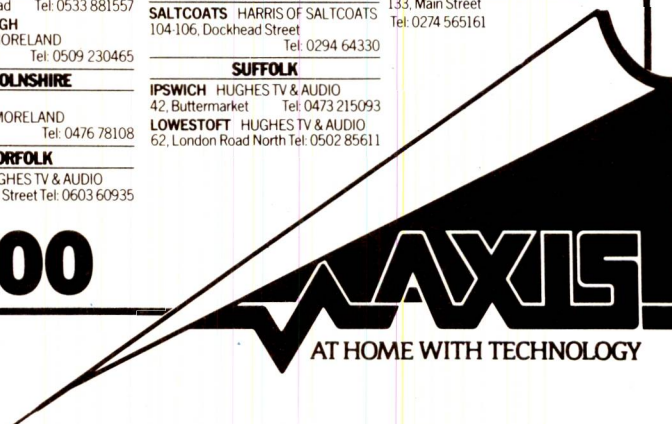
<b>AVON</b> <b>BRISTOL</b> C.J. FREEMAN & CO. LTD. 47, High St., Portishead Tel: 0272 848180 <b>BEDFORDSHIRE</b> <b>BEDFORD</b> TAVISTOCK HI-FI LTD. 21, The Broadway Tel: 0234 56323 <b>BERKSHIRE</b> <b>SLOUGH</b> C.F. LAKE LTD. 37, Stoke Road Tel: 0753 38287 <b>WINDSOR</b> SONICS HI-FI LTD. 58, Grove Road Tel: 07535 60716 <b>BUCKINGHAMSHIRE</b> <b>CHESHAM</b> D.L. CHITTENDEN LTD. 59-61, The Broadway Tel: 0494 784441 <b>HIGH WYCOMBE</b> C.F. LAKE LTD. 117/118 Oxford Street Tel: 0494 28605 <b>CHESHIRE</b> <b>NORTHWICH</b> NORDIS LTD. 39, Chester Way Tel: 0606 3691 <b>CREWE</b> ROY TOWNSEND SOUND & VIDEO 2-4 Victoria Street Tel: 0270 213276	<b>CLEVELAND</b> <b>STOCKTON N TEES</b> MCKENNA & BROWN LTD. 81, High Street Tel: 0642 679995 <b>DERBYSHIRE</b> <b>DERBY</b> STUART WESTMORELAND 67, St. Peter's Street Tel: 0332 367546 <b>DURHAM</b> <b>DARLINGTON</b> MCKENNA & BROWN LTD. 102, Bondgate Tel: 0325 59744 <b>EAST SUSSEX</b> <b>EASTBOURNE</b> CLEARVIEW RENTAL 215, Seaside Tel: 0323 21646 <b>SEAFOED</b> CLEARVIEW RENTAL 34-40, High Street Tel: 0323 898989 <b>ESSEX</b> <b>GRAYS</b> A.C.L. RADIO SERVICES LTD. 1, Northmill Tel: 0375 4666 <b>ILFORD</b> D. WOOLMAN LTD. 76, Ilford Lane Tel: 01-478 1307 <b>SOUTH BENFLEET</b> HODGES & JOHNSON LTD. 285, High Road Tel: 037 45 58725	<b>WESTCLIFF</b> HODGES & JOHNSON LTD. 96-98, Hamlet Court Road Tel: 0702 334488 <b>CHELMSFORD</b> RUSH HI FI 5-6, Cornhill Tel: 0245 57593 <b>GRAMPIAN REGION</b> <b>ABERDEEN</b> A & G KNIGHT 108, Rosemount Place Tel: 0224 630526 <b>LONDON &amp; GREATER LONDON</b> <b>WC1</b> HI-WAY HI-FI LTD. 67 Tottenham Court Road (Goodge Street) Tel: 01-637 9787 <b>W2</b> HI-WAY HI-FI LTD. 313-315 Edgware Road Tel: 01-723 5251 01-402 2441 <b>CROYDON</b> J & T ROBINSON LTD 20, Norfolk House, George Street Tel: 01-681 2800 <b>SUTTON</b> LANDAU RADIO LTD. 195-197, High Street Tel: 01-643 0027 <b>HAMPSHIRE</b> <b>BASINGSTOKE</b> SEWARDS 18, Paddington House, Bedford Walk Tel: 0256 65665	<b>KENT</b> <b>GRAVESEND</b> BENNETT & BROWN 181-183, Windmill Street Tel: 0474 52919 <b>SHEERNESS</b> BRITAIN & HOBBS LTD. 22-24, High Street Tel: 0795 665551 <b>LANCASHIRE</b> <b>PRESTON</b> GOODRIGHTS LTD. 1, Friargate Tel: 0772 57528 <b>BARNOLDSWICK</b> HARRY GARLICK (TV CENTRE) 1, Church Street Tel: 0282 813309 <b>BURNLEY</b> HARRY GARLICK (TV CENTRE) 10, Howe Walk Tel: 0282 37118 <b>LEICESTERSHIRE</b> <b>WIGSTON</b> A.G. KEMBLE LTD. 63, Leicester Road Tel: 0533 881557 <b>LOUGHBOROUGH</b> STUART WESTMORELAND 33, Cattlemarket Tel: 0509 230465 <b>LINCOLNSHIRE</b> <b>GRANTHAM</b> STUART WESTMORELAND 49, High Street Tel: 0476 78108 <b>NORFOLK</b> <b>NORWICH</b> HUGHES TV & AUDIO 17-21, White Lion Street Tel: 0603 60935	<b>NORTHERN IRELAND</b> <b>NORTH BELFAST</b> THE GRAMOPHONE SHOP 16 Donegal Square Tel: 0232 240046 <b>NORTH YORKSHIRE</b> <b>YORK</b> CUSSINS & LIGHT LTD. Kings Square Tel: 0904 55666 <b>NOTTINGHAMSHIRE</b> <b>NOTTINGHAM</b> E.N.L. AUDIO VISUAL 116-118, Alfreton Road Tel: 0602 784015 <b>STAFFORDSHIRE</b> <b>STOKE-ON-TRENT</b> ROY TOWNSEND SOUND & VIDEO 10, Trinity Street, Hanley Tel: 0782 289114 <b>STRATHCLYDE REGION</b> <b>SALTCOATS</b> HARRIS OF SALTCOATS 104-106, Dockhead Street Tel: 0294 64330 <b>SUFFOLK</b> <b>IPSWICH</b> HUGHES TV & AUDIO 42, Buttermarket Tel: 0473 215093 <b>LOWESTOFT</b> HUGHES TV & AUDIO 62, London Road North Tel: 0502 85611	<b>SURREY</b> <b>DORKING</b> DORKING AUDIO SYSTEMS 23, South Street Tel: 0306 882897 <b>W. GLAMORGAN</b> <b>SWANSEA</b> RADIO SUPPLIES SWANSEA LTD. 80 Gower Road, Sketty Tel: 0792 204140 <b>WEST YORKSHIRE</b> <b>HOLMFIRTH</b> FRANK PLATT ELECTRICAL Victoria House, 24, Victoria Street Tel: 0484 682036 <b>HALIFAX</b> FRED MOORE LTD. 15-17, Southgate Tel: 0422 67763 <b>BINGLEY</b> SPENCER & HILL LTD. 133, Main Street Tel: 0274 565161
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Demand for some MSX products means supplies are limited. Please phone your dealer to check that he has stock available.

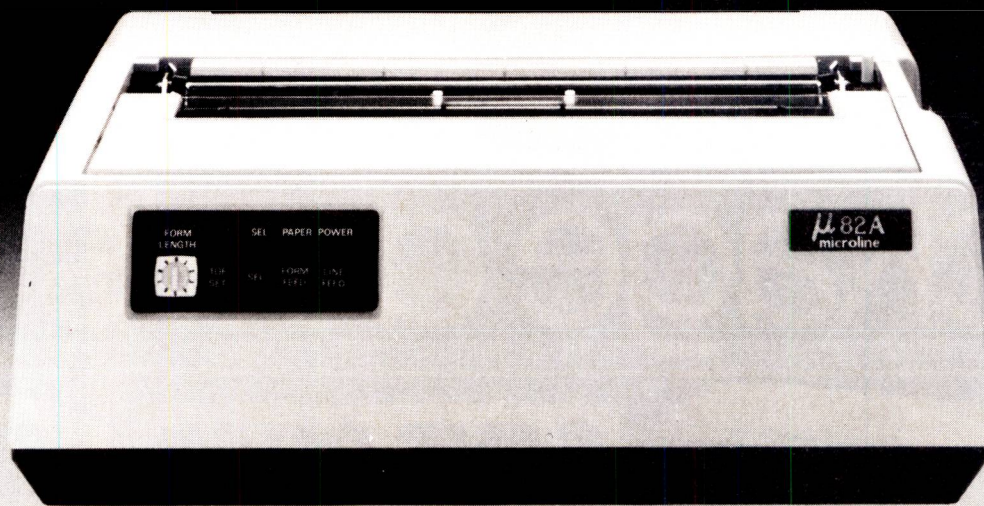
Note: For your local stockists of particular products in this advertisement.

## Ring Teledata 01-200 0200

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.





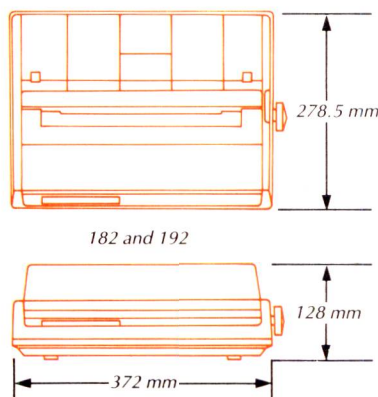


The MICROLINE 82A

# FROM EXCELLENCE THE NEW OKI

Above we show you two printers (to the same scale). On the left is the OKI MICROLINE 82A - one of the most successful standard dot matrix printers ever manufactured. On the right is the printer that will become the NEW standard for dot matrix printers - the new MICROLINE 182 - from OKI.

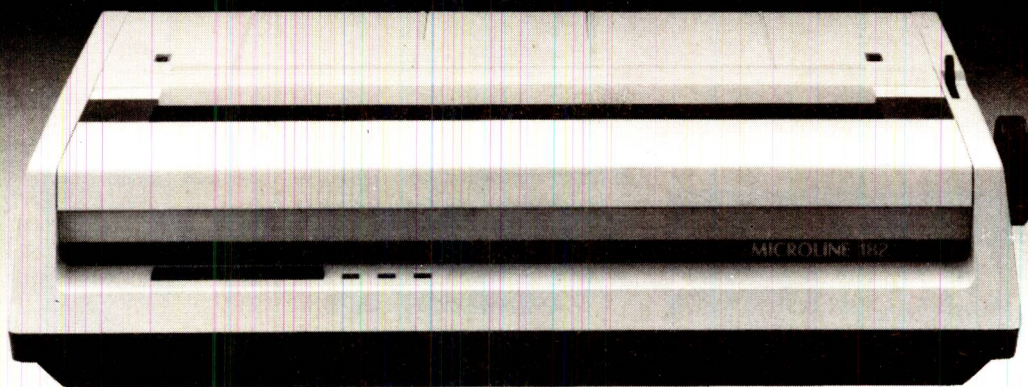
In the past OKI have always achieved excellence in their printer products - now we believe they've reached perfection! OKI's revolutionary design concept for the new Microlines sets hitherto unparalleled standards of performance, styling - and price.



The dimensions of the larger Microline 193 are, length 524 mm, width 278.5 mm and height 128 mm. These dimensions do not include the platen and tractor unit.

The new MICROLINE 182 is the first of a whole new range of printers from OKI which fulfil all the requirements of today's printing needs. With operating noise level reduced to an almost unbelievable 58dB. and a print speed of 120 characters/second, listings, invoices and many other applications are all handled quietly, with upmost speed and efficiency. If your requirement is for high resolution computer graphics, the MICROLINE 182 will reproduce your screen images with a degree of accuracy never before seen from a matrix printer. True underlining, superscript and subscript are





*The new MICROLINE 182 to the same scale as the 82A*

# TO PERFECTION MICROLINES

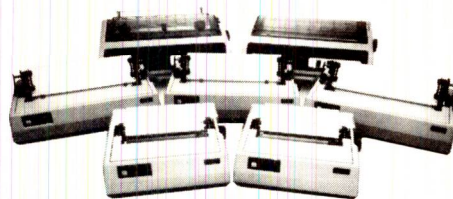
## OKI IS O.K.

also incorporated as standard. In addition a new concept in ribbon design, allows a single action 'clean hands' operation.

But that's not all - complementing the new styling and incorporating even more features are the MICROLINE 192 and 193. Both have the same incredibly high specification as the 182 - PLUS

- Even faster throughput (160 cps)
- Correspondence quality printing
- Down line loadable character font memory - with battery back-up
- Operator selectable default settings.

# OKI



# X-DATA

A Subsidiary of **Dyneer** Corporation

X-DATA Ltd. 750/751 Deal Avenue  
Slough Trading Estate Berks SL1 4SH  
Tel: Slough, (0753) 72331 Tlx. 847728

The reputation of OKI MICROLINE printers was built on excellence of quality and reliability. The new Microlines are no exception - even higher quality, greater reliability and performance bring the new generation of OKI MICROLINE printers - to near perfection.

**Contact your local dealer for more details of the new generation from OKI or contact us directly at the address below. Insist on perfection.... insist on OKI.**



# spectrum

## Sinclair Flat Screen T.V.



- Pin sharp picture gives a bright, clear image almost anywhere, anytime.
- Powered from long life lithium batteries or via optional mains adaptor
- Receives UHF broadcasts anywhere (except France and Communist Bloc)
- Complete with integral fold-away aerial; personal earphone and smart soft carrying case and battery.

Accessories:  
Optional mains adaptor ..... £7.95  
Spare batteries, pack of 3 ..... £9.95

Only £8 monthly with Spectrum Chargecard\* APR 29.8% (variable).

**£99.95**

## New Products!

### Enterprise Computer

- RAM 64K expandable to 3.9 megabytes
- ROM 48K including BASIC cartridge expandable up to 3.9 megabytes
- Very sophisticated operating system, providing a dynamic memory management technique around a Z80A processor running 4MHz
- Built in word processor
- Graphics resolution up to 672 x 512, colours up to 256 on screen
- Stereo sound from 4 voices over 8 octaves
- Fully structured ANSI standard BASIC
- Keyboard, 68 full travel keys, space bar and built in joystick
- 2 external joystick ports, 2 cassette interfaces
- Parallel printer port, RGB monitor output
- Full expansion possible via a 64-way interface
- RS423 serial interface and built-in network for up to 32 computers
- Cartridge ROM bay, to 64K



Only £11 monthly with Spectrum Chargecard\* APR 29.8% (variable).

Mitsui Quick Data Drive for MSX Computers	£139.95
Mitsui Quick Data Diskette	£3.99
Cumana Electron Interface	£149.95 inc. VAT
Commodore Business Package	£549.95
Quenda DMP1100 Printer	£269.99
Juki 2200 Portable Typewriter/Daisywheel Printer	£343.83
Canon PW1080A Printer	£349.00
Elephant 5 1/4" Diskettes (10 Box) from	£22.50
System 2000 Computer Desk and Monitor Bridge	£49.95



## NEW! Commodore 64 Business Package

- Commodore 64 Computer
- Commodore MSP 801 printer
- Commodore 1541 disc drive
- Plus "Future Finance" & "Easy File"

Spectrum  
Price

SAVE OVER  
**£150**

**£549.95**

Only £23 with Spectrum Chargecard\* APR 29.8% (variable)



Spectrum  
Price

**£308.50**

SAVE OVER  
**£50**

Regular price  
if brought  
separately  
**£359.87**

Only £13 monthly with Spectrum Chargecard\* APR 29.8% (variable)

## "Super Value" MSX Package

- Goldstar MSX Computer
- Mitsui quick data drive
- Power supply for quick data drive
- Two discs for quick data drive

## Super Computer Offers from Spectrum



### BBC Model B

with built in  
Speech Synthesiser  
worth £50

Only £15 monthly with Spectrum Chargecard\* APR 29.8% (variable)

**£349.95**



### Sinclair Spectrum + "Fantastic Value for Money"

- 48K RAM
- 10 octave sound
- 8 colours
- Professional keyboard

Only £8 monthly with Spectrum Chargecard\* APR 29.8% (variable)

**£129.95**

### Spectrum 48K

Plus  
**FREE!**  
Software  
6 Pack

**£99.95**

Only £8 monthly with Spectrum Chargecard\* APR 29.8% (variable)

### Atari 800XL Starter Pack



- Includes:
- Atari 1010 data recorder
- Introduction to programming software
- Pole position game cassette
- Demonstration cassette

Only £8 monthly with Spectrum Chargecard\* APR 29.8% (variable)

**£129.99**

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE



**Up to £1000  
Instant Credit**

\*There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only). Typical APR 29.8%.

## Latest News

for up to date, information & offers from SPECTRUM - see PRESTEL page 600181 for details.



# Super Value Printers & Disc Drives

from Your Computer Specialist Nationwide



## Brother EP-44 Printer/Typewriter

'Transforming Office Machinery', runs Brother's slogan - with these super-compact battery powered type-writers it's easy to see why.

- Top quality thermal head
- 4K of text memorise (3 A4 pages)
- Centering if required
- 15-digit LCD display for pre print corrections
- Line-by-line edit facility

Only £11 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£249.95



## Brother M1009 Printer

- 50 cps Bidirectional printing
- normal/enlarged/condensed/emphasized/Elite/superscript/subscript characters
- Centronics interface
- Optional RS232 Interface

Only £9 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£199.95



## Brother HR5 Printer with Commodore Cable

- Top quality Letter-quality daisywheel printing
- Between 13 and 18cps
- Bi-directional printing
- Tractor-fed paper or single sheets

Only £8 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£149.95

## Juki 2200 Printer

NEW!



Electronic daisywheel typewriter with RS-232C or Centronics Interface for computer printer

- 10 cps
- 10/12/15 cpi pitch
- 12 inch paper width/9 inch print width
- Normal/decimal tabs

Only £15 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£343.85



## Quendata DMP 1100 Printer

- Bi-directional printing
- Normal/enlarged/condensed/Elite/characters
- Centronics interface
- Optional RS232 interface

Only £12 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£269.99



## Juki 6100 Daisy Wheel Printer

- 20cps (av. 18cps Shannon Text)
- 10/12/15 or Proportional character spacing
- Bidirectional friction-feed
- Tractor-feed or cut paper

Only £17 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£399.00

## Canon PW-1080A

NEW!

## Dot Matrix Printer

- 160 cps
- Bidirectional printing in text mode
- Normal/enlarged/condensed/condensed/enlarged/Elite/Elite enlarged/characters
- Centronics interface
- Optional RS232 interface

Only £17 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£349.00



## Commodore 1541 Disc Drive

- 5 1/4 inch disc
- Expansion bus for other peripherals
- Built-in disc controller and operating system

Only £9 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£199.00



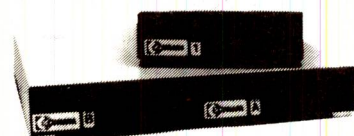
## Amstrad 3" Disc Drive

- 3 inch disc drive
- Single sided double density
- CPM & Logo
- Built-in power supply
- Complete with interface

Only £9 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

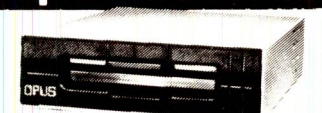
£199.95

## Cumana Disc Drives



CSX 100 40 Track 100K SS	£124.95	CS 400S 80 Track DS with PSU	£219.95
CSX 200S 40/80 Track 100K SS	£159.95	CD 400D 80 Track DS Dual Drive with PSU	£325.95
CSX 400S 40/80 Track 100K SS	£189.95	CD 800S Dual 40/80 Track DS with PSU	£414.95
CS 200S 40/80 Track SS with PSU	£192.95	Cumana 351 SS 40 Track 3 1/2" Drive	£159.95
CS 200D 40 Track DS with PSU	£169.95	Cumana 354 DS 80 Track 3 1/2" Drive	£229.95
CD 200 40 Track Dual Drive	£294.95		

## Opus Disc Drives



Opus 5401 100K SS 40 track	£149.95
Opus 5402 200K DS 40 track	£169.95
Opus 5802 400K DS 40/80 track	£199.95
Opus 5802D 2x400K DS 40/80 Track	£499.95

## Entrepo Quick Data Drive



- Quick operating system
- Extra blank microwafer and operating manual

Only £8 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£79.95



Only £8 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£139.95 'New Exclusive'

## Mitsui Quick Data Drive for MSX

Also available

MSX Printer Lead	£19.95
MSX Monitor Lead	£3.95
MSX Quickshot I Joystick	£9.95

## Rotronics Wafer Drive



- Versatile twin datadrive for the ZX Spectrum
- Twin 128K drives
- 16K, 64K or 128K Wafers

Only £8 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£129.95

## Datafax Disc Interface



Allows you to run 3-3 1/2" or 5 1/4" disc drives Spectrum or Spectrum Plus

Only £8 monthly with Spectrum ChargeCard\*  
APR 29.8% (variable)

£79.95

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

## Computer Dealers

or prospective dealers. If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis, please write to Bob Cleaver, Spectrum Group PLC, Hunting Gate, Hitchin, Herts SG4 0TJ. Tel: (0462) 37171

## More from Spectrum...



# spectrum

## Super Value Monitors & T.V.'s from Spectrum

**Fidelity Prism Monitor**  
for use with  
the Sinclair QL

**£199.95**

Only £9 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**Fidelity CM14  
Monitor**

**£199.95**

Only £9 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).



**Commodore 1702  
Monitor**

**£230.00**

- 14" colour, sound monitor
- PAL/RGB composite
- Tint and volume controls

Only £10 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**Microvitech Cub  
1451 Monitor for use with the QL**

**£275.00**

Only £12 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**Microvitech Cub  
452/1431 Monitor  
Standard Resolution  
for BBC**

**£229.00**

Only £10 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).



**AVT  
Monitors**

**£99.95**

- Available in Green or Orange screen displays
- Glare or Non-Glare screens
- For office micros, or personal computers

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**Tatung  
14" Colour T.V.**

**£234.95**

- TV/RGB switchable
- 8 channels
- 14" tube

Only £10 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**Sanyo CRT36 Monitor**

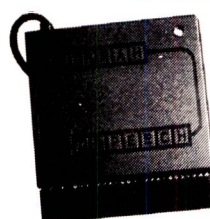
**£146.05**

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

## Super Value Accessories

### Super Value Package for Spectrum

Currah Microslot for ZX Spectrum  
Currah Microspeech for ZX Spectrum



- DK Tronics single port joystick interface
- Quickshot II joystick

**SAVE OVER  
£5.00**

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable). Regular Price if brought Separately £46.85

**£41.75**

**Joystick Converter for  
CBM C16 Plus  
Quickshot 2 Joystick**

**£12.95**

Regular Price  
**£15.70**  
**SAVE £2.75**

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**DK Tronics Dual Port  
Interface for Oric Plus  
Interceptor Joystick**

**£18.95**

Regular Price  
**£21.95**  
**SAVE £3.00**

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**'Unique to Spectrum Authorised Dealers'**



**DK Tronics Single Port  
Interface Plus Quickshot  
II Joystick  
for the Spectrum**

**£17.95**

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

**Omega  
Data Recorder**

with Azimuth Tape  
Plus Gemini Carrying Case  
inc. 10 x C12  
cassettes

**£27.50**

**SAVE OVER £3.00**

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

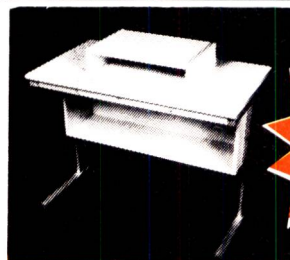
**Cheetah  
Infra Red Joystick**

Plus Currah Microspeech  
For Commodore 64

**£47.75**

**SAVE OVER  
£4.00**

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).



**System 2000 Desk**

**£49.95**

- Movable bridge
- Shelf below work finish surface
- Attractive design with natural pine finish legs and support rails and magnolia surfaces

Only £8 monthly with Spectrum Chargecard\*  
APR 29.8% (variable).

Not all stores carry every advertised item. please phone before making a journey - prices correct at time of going to press E&OE



**Up to £1000  
Instant Credit**

\*There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only). Typical APR 29.8%.

**Latest News**

for up to date information & offers from SPECTRUM - see PRESTEL page 600181 for details.



# Your Computer Specialist Nationwide There's one near you!

## AVON

**BATH** Software Plus, 12 York St  
Tel. (0225) 61676  
**WESTON-S-MARE** K & K Computers,  
32 Alfred St Tel. (0934) 419324

## BEDFORDSHIRE

**RIGGLESWADE** HCCS Ltd., 22 Market Sq.  
Tel. (0767) 318844  
**DUNSTABLE** Dormans 7-11 Broad Walk  
Tel. (0582) 65515  
**LUTON** Terry-More, 49 George St.  
Tel. (0582) 23391/2

## BERKSHIRE

**BRACKNELL** Computer Centre, 44 The  
Broadway Tel. (0344) 427317  
**SLOUGH** MU Games and Computers 245  
High St. Tel. (0753) 21594  
**WINDSOR** Gadgets 30 Peascod St.  
Tel. (07535) 67211

## BUCKINGHAMSHIRE

**CHESHAM** Reed Photography & Com-  
puters, 113 High St. Tel. (0494) 783373

## CAMBRIDGESHIRE

**HUNTINGDON** T.S.C. Electronics, 3 All  
Saints Passage, High St.  
Tel. (0480) 411579  
**PETERBOROUGH** Logic Sales, 6 Midgate  
Tel. (0733) 49696

## CHANNEL ISLANDS

**GUERNSEY** Gruts, 3-5 The Pollett, St Peter  
Port Tel. (0481) 24682  
**JESEY** Audio & Computer Centre,  
7 Peter St, St Helier. Tel. (0534) 74000

## CHESHIRE

**ALTRINCHAM** Mr Micro 28 High St.  
Tel. (061) 941 6213  
**CHESTER** Computer Link, 21 St Werburgh  
St. Tel. (0244) 316516  
**CREWE** Microman Unit 2,  
128 Nantwich Rd. Tel. (0270) 216014

## CLEVELAND

**MIDDLESBOROUGH** McKenna & Brown,  
206 Linthorpe Rd. Tel. (0642) 222368

## CORNWALL

**ST AUSTELL** A B & C Computers, Duchy  
House, 6 Lower Aylmer Sq.  
Tel. (0726) 67337

## CUMBRIA

**BARROW IN FURNESS** Cumbria Audio  
Visual & Electrical (C.A.V.E.), 48 Cavendish  
Street Tel. (0229) 20109  
**PENRITH** Penrith Communications,  
14 Castlegate Tel. (0768) 67146  
Open Mon-Fri till 8pm  
**WHITEHAVEN** P D Hendren 15 King St.  
Tel. (0946) 2063

## DERBYSHIRE

**ALFRETON** Gordon Harwood 69-71 High  
St. Tel. (0773) 832078  
**HEANOR** Logic Electrical Engineers, God  
frey St, Heanor Derby Tel. (0773) 76980

## DEVON

**BRIXHAM** Discus Computers, Beach  
Approach, Tel. (08045) 55532

**EXETER** Seven Counties (Computers) Ltd.,  
7 Paris Street Tel. (0392) 211211  
**EXMOUTH** Open Channel, 30 The Strand  
Tel. (0395) 264408  
**PLYMOUTH** Syntax Ltd., 76 Cornwall  
St. Tel. (0752) 28705  
**TIVERTON** Actron Micro Computers,  
37 Bampton St. Tel. (0884) 252854

## DORSET

**DORCHESTER** Seven Counties Cptrs 20  
High Street East Tel. (0305) 66022  
**POOLE** Lansdowne Cptr Centre 14 Arndale  
Centre Tel. (0202) 670901

## DURHAM

**DARLINGTON** McKenna & Brown,  
102 Bondgate Tel. (0325) 459744

## ESSEX

**BASILDON** Godfrey's 28-32 East Walk,  
Tel. (0268) 289379  
**BASILDON** Godfrey's Computer Centre,  
5 Laindon Main Centre Laindon.  
Tel. (0268) 416747  
**CHELMSFORD** Maxton Hayman Ltd.,  
5 Broomfield Rd. Tel. (0245) 354595  
**GRAYS** H Reynolds, 79 Orsett Rd.  
Tel. (0375) 5948  
**SOUTHEND** Computer Centre 332 London  
Rd. Tel. (0702) 337161

## HAMPSHIRE

**BASINGSTOKE** Fisher's, 2-3 Market  
Place, Tel. (0256) 22079  
**PORTSMOUTH (Waterloo)** G B  
Microland, London Rd., (Opp Co-op)  
Tel. (0705) 259911  
**SOUTHAMPTON** L.T.C. Ltd., 112 East St.  
Tel. (0703) 333958/24703

## HEREFORD

**HEREFORD** Melgray Hi-Tech Ltd., 53/54  
Commercial Str., Tel. (0432) 27537

## HERTFORDSHIRE

**POTTERS BAR** The Computer Shop,  
197 High St. Tel. (0707) 44417  
**STEVENAGE** D J Computers, 11 Town  
Square, Tel. (0438) 65501  
**WATFORD** SRS Microsystems Ltd., 94 The  
Parade, High St. Tel. (0923) 26602  
**WELWYN GARDEN CITY** D J Computers, 40  
Fretherne Rd., Tel. (07073) 28435/28444

## HUMBERSIDE

**BEVERLEY** Computing World, 10 Swaby's  
Yard Dyer Lane. Tel. (0482) 881831  
**GRIMSBY** RC Johnson Ltd., 22 Friargate,  
Riverhead Centre Tel. (0472) 42031  
**HULL** The Computer Centre,  
26 Anlaby Rd. Tel. (0482) 26297

## ISLE OF MAN

**DOUGLAS** T H Colebourn Ltd.,  
57-61 Victoria St. Tel. (0624) 3482

## ISLE OF WIGHT

**COWES** Beken & Son, 15 Bath Rd.  
Tel. (0983) 297181

## KENT

**BECKENHAM** Supa Computers Ltd., 425  
Croydon Rd., Tel. (01) 650 3569

**BROADSTAIRS** Video Vision 19/20 Willow  
Court, St. Peters Park Road Tel. (0843)  
63284 (No Early Closing Day)  
**BROMLEY** Computers Today 31 Market  
Square Tel. (01) 290 5652  
**CANTERBURY** Canterbury Computer Centre,  
56-57 Palace Street, Tel. (0227) 62101  
**DOVER** Kent Photos & Computers, 4 King St.  
Tel. (0304) 202020  
**RAINHAM** Microway Computers Ltd., 39  
High St. Medway Towns, Kent  
Tel. (0634) 376702  
**SEVENOAKS** Ernest Fielder Computers,  
Dorset Street, Tel. (0732) 456800  
**SITTINGBOURNE** Computers Plus, 65 High  
St. Tel. (0795) 25677  
**TUNBRIDGE WELLS** Modata  
Computers Ltd. 28-30 St Johns Rd.  
Tel. (0892) 41555

## LANCASHIRE

**PRESTON** 4-Mat Computing Ltd.,  
67 Friargate Tel. (0772) 561952

## LONDON

**E6** Percivals, 85 High St. North, East Ham.  
Tel. (01) 472 8941  
**E17** Erol Computers Ltd., 125 High Street  
Walthamstow Tel. (01) 520 7763  
**EC2** Devron Computer Centre, 155 Moorgate  
Tel. (01) 638 3339/1830  
**N14** Logic Sales, 19 Broadway, The Bourne.  
Southgate, Tel. (01) 882 4942  
**N20** Castlehurst Ltd. 1291 High Rd.  
Tel. (01) 446 2280  
**NW11** Computers Inc., 86 Golders Green Rd.  
Tel. (01) 209 0401/0279  
**SE1** Vic Odden's 6 London Bridge Walk.  
Tel. (01) 403 1988  
**SE9** Square-Deal, 373-375 Footscray Rd.,  
New Eltham, Tel. (01) 859 1516  
**SE15** Castlehurst Ltd., 152 Rye Lane,  
Peckham, Tel. (01) 639 2205  
**W1** Computers of Wigmore St., 104 Wigmore  
St. Tel. (01) 935 2452  
**W1** Micro-Foto, 14-16 Quadrant Arcade,  
Regent Street Tel. (01) 437 5336/5471  
**W1** Sonic Foto & Micro Centre, 256  
Tottenham Court Rd. Tel. (01) 580 5826  
**W1** Ramsons, 4 Edgeware Road,  
Tel. 01 724 2373

## GREATER MANCHESTER

**OLDHAM** Home & Business Computers Ltd.,  
54 Yorkshire St. Tel. (061) 6331608  
**ROCHDALE** Home & Business Computers,  
75 Yorkshire Street, Tel. (0706) 344654  
**SWINTON** Mr Micro Ltd., 69 Partington  
Lane, Tel. (061) 728 2282  
Late Night Friday  
**WIGAN** Wilding Ltd., 11 Mesnes St.  
Tel. (0942) 44382

## MERSEYSIDE

**LIVERPOOL** Home & Business Cptrs 31 Bold  
St. Tel. (051) 708 0428  
**LIVERPOOL** Beaver Radio, 20-22 White-  
chapel Tel. (051) 709 9898  
**LIVERPOOL (Aintree)** Hargreaves, 31-37  
Warbreck Moor Tel. (051) 525 1782

## MIDDLESEX

**TEDDINGTON** Andrews, Broad St.  
Tel. (01) 977 4716  
**PINNER** Spectrum 91 Field End Rd.,  
Eastcote Tel. (01) 868 6830/6860  
**UXBRIDGE** J K L Computers, 7 Windsor St.  
Tel. (0895) 51815

## NORFOLK

**KING'S LYNN** Computer Plus, 40 Conduit St.  
Tel. (0553) 4550  
**NORWICH** Norwich Camera Centre 20  
White Lion Str. Tel. (0603) 612537  
**NORWICH** Brainwave 11A Castle Meadow  
Tel. (0603) 663796  
**THETFORD** C B & Micros, 21 Guildhall  
Street, Tel. (0842) 61645

## NORTHAMPTONSHIRE

**NORTHAMPTON** Dormans, 22 Princes Walk  
Grosvenor Centre. Tel. (0604) 37031

## NOTTINGHAMSHIRE

**NOTTINGHAM** Jacobs Computers,  
13 Middlegate Newark.  
Tel. (0636) 72594  
**WORKSOP** Computagrafix, 132 Bridge St.  
Tel. (0909) 472248

## NORTHERN IRELAND

**PORTADOWN** Pedlows, 16 Market St.,  
Craigavon, County Armagh  
Tel. (0762) 332265  
**NEWRY** Newry Computer Centre 34  
Monaghan St. Tel. (0693) 66545

## NORTHUMBERLAND

**MORPETH** Telerents 31 Newgate St. Tel.  
(0665) 513 537

## OXFORDSHIRE

**ABINGDON** Ivor Fields Computers, 21 Stert  
St. Tel. (0235) 21207  
**BANBURY** Computer Plus, 2 Church Lane.  
Tel. (0295) 55890  
**OXFORD** Ivor Fields, 7 St Ebbs St  
Tel. (0865) 247082

## SCOTLAND

**ABERDEEN** Dee Micro 278  
George Street Tel. (0224) 644350  
**AYR** Vennals, 6A New Bridge St.  
Tel. (0292) 264124  
**DUNDEE** Micromania 60 Gray St., Boughty  
Ferry Tel. (0382) 77130  
**HAMILTON** Tom Dickson Computers, 8-12  
Cadzow St. Tel. (0698) 283193

## SHROPSHIRE

**SHREWSBURY** Computerama,  
13 Castlegate Tel. (0743) 60528  
**TELFORD** Computer Village, 4 Hazeldine  
House Telford Town Centre  
Tel. (0952) 506771

## SOMERSET

**TAUNTON** Grays, 1 St James St.  
Tel. (0823) 72986

## STAFFORDSHIRE

**STAFFORD** Computerama, 59 Forgate St.  
Tel. (0785) 41899  
**STOKE-ON-TRENT** Computerama, 11 Mkt  
Square Arcade Hanley (0782) 268620  
**HEDNESFORD** Disco's Ltd., East Cannock  
Rd., Tel. (054) 382021

## SUFFOLK

**BURY ST EDMUNDS** Guildhall Cptr Ctr. 11  
Guildhall St. Tel. (0284) 705772  
**LOWESTOFT** John Wells, 44 London Rd  
North Tel. (0502) 3742

## SURREY

**CAMBERLEY** Camera Arts (Micro Computer  
Division), 36 High St. Tel. (0276) 65848  
**EPSOM** The Micro Workshop, 12 Station  
Approach Tel. (03727) 21533  
**WALLINGTON** Surrey Micro Systems Ltd.,  
53 Woodcote Rd. Tel. (01) 647 5636  
**WOKING** Harpers, 71-73 Commercial Way  
Tel. (04862) 25657

## SUSSEX

**BEXHILL-ON-SEA** Computerware, 22 St  
Leonards Rd. Tel. (0424) 223340  
**BOGNOR REGIS** Bits & Bytes High Str., Tel.  
(0243) 867143  
**BRIGHTON** Gamer 71 East St.  
Tel. (0273) 728681  
**BURGESS HILL** Weald Cptrs, 247-249 Lon-  
don Rd. Tel. (04446) 41381  
**CRAWLEY** Gatwick Computer Services, 62  
Boulevard, Tel. (0293) 37842  
**LITTLEHAMPTON** Alan Chase Ltd., 39 High  
St. Tel. (0903) 715674

## WALES

**ABERYSTWYTH** AberData at Galloways, 23  
Pier St. Tel. (0970) 615522  
**CARDIFF** Randall Cox, 18-22 High St  
Arcade Tel. (0222) 31960  
**NEWPORT (Gwent)** Randall Cox, 118  
Commercial St. Tel. (0633) 67378  
**PEMBROKE** Randall Cox, 19 Main St.  
Tel. (064) 682876  
**WREXHAM** Wrexham Computer Centre, 24  
Abbot St., Clywd Tel. (0978) 358832

## WARWICKSHIRE

**NUNEATON** Micro City 1A Queens Road  
Tel. (0203) 382049

## WEST MIDLANDS

**BIRMINGHAM** Software World 12 Ethel  
Street Tel. (021) 643 7559  
**COVENTRY** Greens, 22 Market Way.  
Tel. (0203) 28342  
**DUDLEY** Central Computers, 35 Church Hill  
Precinct, Tel. (0384) 238169  
**WALSALL** New Horizon Computer Centres, 1  
Goodall St. Tel. (0922) 24821  
**WEST BROMWICH** Bell & Jones, 39 Queens  
Square, Tel. (021) 553 0820  
**WOLVERHAMPTON** Wolverhampton Com-  
puter Centre, 17/19 Litchfield St. Tel. (0902)  
29907

## WORCESTER

**KIDDERMINSTER** Central Computers, 20-  
21 Blackwell Street, Tel. (0562) 746941  
**WORCESTER** David Waring Ltd., 1 Marmion  
House High St. Tel. (0905) 27551

## YORKSHIRE

**BRADFORD** Erricks, Fotosonic House  
Rawson Square Tel. (0274) 309266  
**DONCASTER** The Soft Centre 8 Queens-  
gate Waterdale Centre Tel. (0302) 20088  
**ROTHERHAM** GT Leisureworld,  
Cascade Centre Tel. (0709) 67391  
**SHEFFIELD** HVL Computers 812 Ecclesall  
Rd., Tel. (0742) 661328  
**YORK** York Computer Centre 7 Stonegate  
Arcade, Tel. (0904) 641862

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd

# spectrum

## See your local Spectrum Computer Specialist today!



BEST  
PRICE/SERVICE  
RATIO  
AVAILABLE

# LIBRA

Business Supplies Limited

## Magnetic Media Specialists

### Diskettes

		Per box of 10	
		1-9 boxes	10 + boxes
		£	£
3" MAXELL CF2		46.00	36.00
3 1/2" FUJI DS		47.00	47.00
5 1/4" <b>DYSAN</b>		20.50	16.10
	SS/DD 48 tpi	29.50	22.50
	SS/QD 96 tpi	29.50	22.50
	DS/QD 96 tpi	37.50	28.60
5 1/4" <b>NASHUA</b>		14.00	9.90
	SS/DD 48 tpi	16.60	12.60
	DS/DD 48 tpi	19.50	14.75
	SS/QD 96 tpi	21.50	15.50
	DS/QD 96 tpi	24.00	17.50

8", HARD SECTOR AND PREFORMATTED DISKETTES AVAILABLE  
ATHANA, 3M AND VERBATIM ALSO STOCKED P.O.A.

DISC PACKS  
DISK CARTRIDGES  
FAST DELIVERY

MAGNETIC TAPE  
TAPE CARTRIDGES  
P.O.A.

DISKETTE DRIVE CLEANERS FD-05/FD-08 £12.00  
CC1 ALL-PURPOSE COMPUTER CLEANER 3.50  
CC7 LINT-FREE WIPERS 2.70

\* PRICES EXCLUDE VAT/CARRIAGE \*  
\* TRADE ENQUIRIES WELCOME \*  
\* SEND FOR PRODUCT LIST \*

ACOUSTIC HOODS ANTI-GLARE SCREENS LISTING PAPER  
BURSTERS FIREPROOF SAFES LABELS  
DECOLLATORS RACKING BINDERS  
SHREDDERS TRANSIT CASES FILING SYSTEMS  
WORK STATIONS TELEX ROLLS RIBBONS  
VDU DESKS CUSTOM PRINTING PRINT WHEELS

\*\* APPLY FOR ACCOUNT FACILITIES NOW \*\*

## LIBRA

Business Supplies Limited

CHILTERN, BATCHWORTH LANE, NORTHWOOD, MIDDX HA6 3HE  
09274 (65 from London) 28598

# POLYPRINT

## DOTMATRIXDAISYWHEEL?

★ ★ ★

**POLYPRINT!**  
**NLQ Printing Program**  
**For Most Printers**  
**12 Typefaces Supplied**  
**Stylish Simplicity**

**IBM Apricot QX-10**  
**CPM 80**

**ARCOM**  
**SOFTWARE**

**£26 + VAT**

Dept 1, 45B Princess Road, Poole, Dorset BH12 1BG.  
Tel: (0202) 762236

**NEED  
A  
COMPUTER**

**WHERE  
TO  
GO?**

**WORLDWIDE  
COMPUTERS**

**WHY?**

**THEY KNOW  
WHAT THEY'RE  
TALKING  
ABOUT**



**01-947 8562  
&  
(0273) 609331**

### COMPUTERS

Apricot -  
PC 256K RAM + 2 x 315K D/D ..... £1229.00  
PC 256K RAM + 2 x 720K D/D ..... £1379.00  
X110 256K RAM 10MB Winchester ..... £2099.00  
File 256K RAM 1 x 315K D/D ..... £799.00  
FI 256K RAM 1 x 720K D/D ..... £899.00  
Point 7 512K RAM 10MB + Cluster ..... £2799.00  
Point 32 256K RAM 10MB F/Server ..... £2399.00  
Commodore C16 Starter Pack ..... £75.00  
Commodore Plus 4 ..... £119.00  
Commodore SX64 ..... £575.00  
Commodore PC10 ..... £1449.00  
Epson QX10 ..... £1299.00  
Epson Portables and Software ..... from £649.00  
128 K Upgrade with above ..... add £150.00  
IBM PC 64 1 x DD Mono ..... £1516.00  
IBM PC 64 2 x DD Mono ..... £1735.00  
IBM PC 64 10mbHD + 1 x DD Mono ..... £2366.00  
IBM PC 64 20mbHD + 1 x DD Mono ..... £2716.00  
IBM PC XT 10mbHD + 1 x DD Mono ..... £2822.00  
IBM Portable 1 x DD ..... £1699.00  
IBM Portable 2 x DD ..... £1950.00  
IBM Portable 10mbHD + 1 x DD ..... £2549.00  
IBM Portable 20mbHD + 1 x DD ..... £2899.00  
IBM PC AT 1.2mb x DD ..... £2902.00  
IBM PC ATE 20mbHD + 1.2mb x DD ..... £4734.00  
Sanyo MBC 550 1 x 160K D/D ..... £599.00  
Sanyo MBC 555 2 x 160K D/D ..... £699.00  
Sanyo MBC 5502 1 x 360K D/D ..... £799.00  
Sanyo MBC 5552 2 x 360K D/D ..... £1149.00  
Sanyo MBC 775 Portable ..... £1699.00  
256K RAM 2 x 360K D/D ..... £320.00  
Victor/Sirius 9000 inc. mon.:- ..... £1650.00  
2 x 600K D/D + 128K RAM ..... £1899.00  
2 x 1.2MB D/D + 256K RAM ..... £2499.00  
1 x 10MB H.D + D/D + 256K RAM ..... £899.00  
Wren ..... available for export  
Sinclair Spectrum ..... in large quantities only

### DAISY WHEELS

Brother HR15 ..... £315.00  
Brother HR25 ..... £555.00  
Brother HR35 ..... £695.00  
Daisy Step 2000 (20 CPS) ..... £219.00  
Diablo 630 (API) ..... £1310.00  
Epson DX 100 ..... £315.00  
Epson P-40 ..... £85.00  
Epson HI-80 4 pen plotter ..... £349.00  
Hitachi 672 plotter ..... £395.00  
Juki 6100 ..... £299.00  
Juki 6300 ..... £655.00  
Qwen-Delta ..... £225.00  
Qume 11/40 (IRO) ..... £1175.00  
Qume letter Pro 20 ..... £450.00  
Ricoh RP 1300 ..... £875.00  
Ricoh RP 1600 8K ..... £1325.00  
Smith Corona TP 1 ..... £175.00  
Tec 10-40 ..... £845.00

### DOT MATRIX

Anadex DP 9000 ..... £875.00  
Anadex DP 6500 ..... £2300.00  
Brother M1009(P) ..... £155.00  
Canon PW 1080A (NLQ) ..... £279.00  
Canon PW 1156A ..... £355.00  
Canon PJ 1080A (Colour) ..... £379.00  
Epson RX 80 ..... £190.00  
Epson RX 80 F/T ..... £215.00  
Epson RX 100 F/T ..... £325.00  
Epson FX 80 ..... £320.00  
Epson FX 100 F/T ..... £425.00  
Epson LQ 1500 ..... £895.00  
Epson JX80 ..... £455.00  
Hewlett Packard Laser Jet ..... £3250.00  
Mannesmann Tally MT80 ..... £195.00  
Mannesmann Tally MT160 ..... £449.00  
Mannesmann Tally MT180 ..... £549.00  
MP 165 NLQ Printer ..... £275.00  
Mannesmann Tally Pixy Plotter ..... £349.00  
OKI Microline 82A ..... £249.00  
OKI Microline 83A ..... £389.00  
OKI Microline 84P ..... £629.00  
OKI Microline 92P ..... £365.00  
OKI Microline 2350P ..... £1449.00  
Panasonic KP1091 ..... £255.00  
Shinwa CP80 F/T ..... £189.00  
Shinwa 40 (Colour) ..... £119.00  
Smith Corona DM 200(NLQ) ..... £375.00  
Tec 1550 ..... £459.00

### PERIPHERALS

Colour Monitor for Apricot F1 ..... £350.00  
Cables from ..... £10.00  
Commodore 1702 Col Monitor ..... £175.00  
Epson Acoustic Coupler ..... £130.00  
Microvitec 20" Colour Monitor ..... £175.00  
Sanyo 3117 Col Hi Res 600 PIX ..... £279.00  
Sanyo 3125 Col Med Res 400 PIX ..... £175.00  
Sanyo 8112 Green Screen 18MHz ..... £85.00  
Monitor for QL ..... £235.00  
CRT 36 for MBC ..... £100.00

APRICOT High resolution Monitors  
9 ..... £170.00  
12 ..... £212.00

### ACCESSORIES

Keyboards, cables, interfaces, tractor feeds, sheet-  
feeds, disks, software, up-grades, listing paper,  
ribbons, daisy wheels available for most products

All prices excluding VAT and DELIVERY

**FREE COMMODORE  
STARTER PACK WITH  
EVERY PURCHASE  
OVER £3,000  
(WHILE STOCKS LAST)**

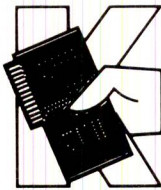
May

Worldwide Computers Limited, Spa House, 11-17 Worple Road, Wimbledon, London SW19 4JS Telex: 8955888 WOWICO  
Also at 2 North Road, Brighton, Sussex BN1 1YA

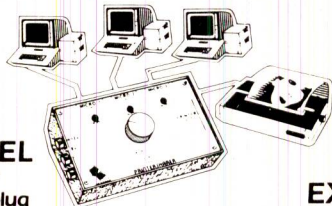


# keyzone

## SOLID STATE DESK TOP SWITCHING DEVICES



## THE PRINTERSHARERS



**PARALLEL**  
With power supply and plug

**EX. VAT**

- 26 PIN (AS BBC) 3 MICROS TO 1 PRINTER £65-
- 26 PIN (AS BBC) 6 MICROS TO 1 PRINTER £129-
- \* 36 PIN (AMPHENOL) 2 MICROS TO 1 PRINTER £90-
- \* 36 PIN (AMPHENOL) 3 MICROS TO 1 PRINTER £105-

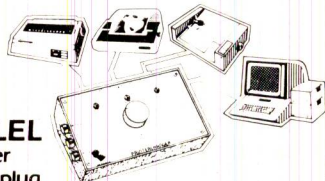
### SOLID STATE SWITCHING

- \* Solid State Switching
- \* Extra cable lengths
- \* No plugging/unplugging
- \* Easy to operate
- \* Simple installation

### SAVES TIME & MONEY

- \* Saves time
- \* Saves money
- \* Connect in multiples
- \* No limit to sharers
- \* 12 months warranty

## THE PRINTERCHANGERS



**PARALLEL**  
With power supply and plug

**EX VAT**

- 26 PIN (AS BBC) 1 MICRO TO 3 PRINTERS £70-
- \* 36 PIN (AMPHENOL) 1 MICRO TO 2 PRINTERS £90-
- 36 PIN (AMPHENOL) 1 MICRO TO 3 PRINTERS £105-

### OPTIONAL

MP1 - DC mains power pack for sharer/changer £6.50

### LEADS - PARALLEL

- 26-26 PIN 2 MTS £9- Each Pack of 3 £25-
- 26-36 PIN 1 MT £10- Each
- 26-36 PIN 1.5 MT £12.50 Each
- 26-36 PIN 2 MT £15- Each

Any cable can be made to order

### SERIAL - RS232 3 way 25 pin

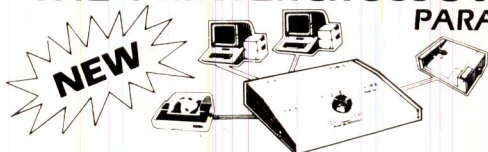
Printershare/Changer Lines 1 to 8, 11, 13, 19 & 20 EX VAT £65-

### LEADS - SERIAL

- 25 pin D type plug on each end -2MT EACH £12- PACK OF 3 £34-
- 25 pin D type plug on each end -5MT £14- £39.50

## THE PRINTERCROSSOVERS

**PARALLEL**



- 26 PIN (AS BBC) 2 MICROS TO 2 PRINTERS £70-
- \* 36 PIN (AMPHENOL) 2 MICROS TO 2 PRINTERS £90-
- \* (METAL CASE BUILT IN SUPPLY)

THE PRINTERCROSSOVER WILL RUN UP TO TWO MICROS AND TWO PRINTERS AT THE SAME TIME - JUST TURN THE DIAL TO CROSS OVER TO THE OTHER PRINTER. CAN BE USED AS SHARER OR CHANGER AS ABOVE.

**KEYZONE LTD**



U 14, Regeneration House, School Road, Park Royal, London NW10 6TD. Telephone: 01-965 1684/1804 Telex: 8813271

P&P Sharer/Changer £1.50 each. MP1 & Leads £0.50 Interfaces £1.00 each

**DISKS**

**DISKS**

**DISKS**

\*\*\*BEST PRICES - TOP QUALITY - FAST DELIVERY\*\*\*

\*\*\*\*\*PRICE PROMISE\*\*\*\*\*  
We will better any genuine delivered price advertised in the current issue of PCW for Boxes of Disks shown in the list below. Please telephone for price.  
\*\*\*\*\*

QUALITY FACTORY SEALED DISKS NORMALLY SAME DAY DESPATCH  
5.25" DISKS

BOXES OF 10 DISKS		Prices per Box (£)		
		1-4	5-9	10-49
<b>MEMRON Coloured Diskettes - Packed in Library Box</b>				
Red, Blue, Green, Yellow, White, Rainbow (2 of each colour)				
1D	HR S/side 5 or D Dens 48tpi 40Tr	21.00	20.00	19.00
2D	HR D/side 5 or D Dens 48tpi 40Tr	26.00	25.00	24.00
1Q	S/side Q Dens 96tpi 80Tr	26.00	25.00	24.00
2Q	D/side Q Dens 96tpi 80Tr	31.50	30.50	28.50

### DYSAN

104/1D	HR S/side D Dens 48tpi 40Tr	16.50	15.90	15.30
104/2D	HR D/side D Dens 48tpi 40Tr	24.00	23.25	22.50
204/1D	HR S/side Q Dens 96tpi 80Tr	24.00	23.25	22.50
204/2D	HR D/side Q Dens 96tpi 80Tr	29.00	28.25	27.50

### VERBATIM DATALIFE (5 Year Warranty)

MD525-01HR	S/side 5 or D Dens 48tpi 40Tr	14.95	14.70	14.20
MD550-01HR	D/side 5 or D Dens 48tpi 40Tr	19.20	18.45	17.70
MD577-01HR	S/side Q Dens 96tpi 80Tr	19.20	18.45	17.70
MD557-01HR	D/side Q Dens 96tpi 80Tr	25.20	24.95	24.00

10 or 16 hard sectors at same price. Add £1.20 for library box.

### MEMOREX (5 year warranty)

3431	HR S/side 5 Dens 48tpi 40Tr	Please Telephone for MOST COMPETITIVE Prices		
3481	HR S/side D Dens 48tpi 40Tr			
3491	HR D/side D Dens 48tpi 40Tr			
3504	HP S/side Q Dens 96tpi 80Tr			
3501	HR D/side Q Dens 96tpi 80Tr			
5500HD	D/side H Dens 1.6MB 80Tr			

### BASF

1D	S/side D Dens 48tpi 40Tr	10.99	10.50	10.00
<b>BASF (Qualimetric) ** FREE Library Box with every 10 Disks **</b>				
1X	HR S/side 5 Dens 48tpi 40Tr	14.10	13.70	13.30
1D	HR S/side D Dens 48tpi 40Tr	14.70	14.20	13.70
2D	HR D/side D Dens 48tpi 40Tr	18.65	17.90	16.65
10/96	HR S/side Q Dens 96tpi 80Tr	19.30	18.55	17.30
20/96	HR D/side Q Dens 96tpi 80Tr	22.00	21.25	20.50
5.25 2D	D/side H Dens 1.6MB 80Tr	37.00	36.00	34.50

### CUMANA - Packed in Library Box

2Q	HR D/side Q Dens 96tpi 80Tr	16.45	15.95	15.45
----	-----------------------------	-------	-------	-------

HR denotes Disks with Reinforced Hub Rings.

### ACCESSORIES

HCK5	Head Clean Kit with Fluid	14.90	14.50	14.00
LC5	5.25 EGLY Library case	1.90	1.80	1.70
LB40-5	ABA Lockable Box 40 Cap inc Disk Pen	13.50	13.00	12.50
LB50-5	ABA Lockable Box 50 Cap inc Disk Pen	14.75	14.25	13.75
LB90-5	ABA Lockable Box 90 Cap inc Disk Pen	16.50	16.00	15.50
VCK-5	Verbatim 5" Head clean kit	6.40	6.20	6.00
VCD-5	Verbatim 5" H/c disks (per 10)	12.50	12.30	12.10
DPEN	BEROL Quality disk pens (per 12)	5.25	5.00	4.75
DL-5	Disk Labels 100 (5 colours)	4.50	4.25	4.00
DM-5	Disk Mailers 4 disk cap (per 100)	21.00	19.50	18.50

### 3.5" DISKS

SONY	OM-D3440	S/side D Dens 80Tr	33.00	32.25	31.50
	OM-D4440	D/side D Dens 80Tr	42.50	41.75	41.00

### VERBATIM

MF350	S/side D Dens 80Tr	34.00	33.25	32.50
-------	--------------------	-------	-------	-------

### BASF (Qualimetric)

FD3.5	S/side 80Tr (Boxed in 5's)	17.00	16.50	16.00
-------	----------------------------	-------	-------	-------

### ACCESSORIES

S10-3.5	SEE-10 Library Box	2.30	2.15	2.00
LB60-3.5	ABA Lockable Box 60 Cap inc Disk Pen	15.50	15.00	14.50

### 8" DISKS

VERBATIM DATALIFE (Five Year Warranty)	FD34-9000	S/side 5 Den	19.50	18.50	17.50
	FD34-8000	S/side D Den	19.50	18.50	17.50
	DD34-4001	D/side D Den	23.00	22.00	21.00

### BASF (Qualimetric)

1X	S/side 5 Dens	16.00	15.00	14.00
1D	S/side D Dens	19.00	18.00	17.00
2D	D/side D Dens	22.00	21.00	20.00

### ACCESSORIES

LB40-8	ABA Lockable Box 40 Cap inc Disk Pen	16.50	16.00	15.50
VCK-8	Verbatim 8" Head clean kit	6.40	6.20	6.00
VCD-8	Verbatim 8" H/c disks (per 10)	12.50	12.30	12.10

### PAPER-LABELS-CASSETTES

PAP1	11"x9.5" 60gsm 2000 Sheets Micro Perf	11.00	10.50	10.00
PAP3	A4 80gsm 2000 Sheets Micro Perf	24.50	23.50	22.50
PAP4	A4 90gsm 1000 Sheets Micro Perf	13.50	12.75	11.50
LAB1	89mmx36mm 2 on web 8000 labels	23.00	22.00	21.00
C12	C12 Quality Screw Assembly(10)	4.50	4.30	4.10

### RIBBONS - PRINTWHEELS - PRINTERS - SOFTWARE

Telephone or write for very competitive prices on a large range of goods.

Please contact us for Quantity Discounts (50+ boxes) and Trade Accounts. Official orders accepted from Government or Educational Establishments.

Description	Quantity	Amount

### Postage/Packaging (UK)

5.25/3.5 Disks, HCK5	£1 /Box* (75p 5+, £5 Max)	Post/Pack Total exc VAT
8" Disks, VCD8, C12	£1.3/Box* (95p 5+, £5 Max)	
LC5, DL5, VCK5/8, VCD5, OPEN	50p/pack (35p 5+, £5 Max)	Total inc VAT
Lockable Box, Labels	£2.5/Box (£2 2+, £5 Max)	
Paper, DMS	£3.5/Box (£2 3+, £15 Max)	

\* Add 30p for First Class Post

Name \_\_\_\_\_ Tel.No. \_\_\_\_\_

Address \_\_\_\_\_

Post Code \_\_\_\_\_

Access/Barclaycard/Cheque No. \_\_\_\_\_

TELEPHONE ORDERS ANYTIME --- WE DO THE REST

34 CANNONBURY AVENUE PINNER MIDDLESEX HA5 1TS

01 868 9548



**Pinner Wordpro**







# At £1575 it's a portable you can take sitting down

At £1575, the Bondwell 2 is more than just a pleasant surprise. It's a true personal computer that's also a lap-held portable. A full-sized screen, integral disk drive and complete suite of software is only the start. Equivalent machines are twice the price (at least) or offer half the features.

Weighing in at 12 lbs, the Bondwell 2 fits in a briefcase. MicroPro word processing, database manager, report generator and electronic spreadsheet (worth up to £1000) are included in the price. As well as everything else you expect in a lap-held portable: rechargeable battery, qwerty keyboard communications ports and an expansion slot.

Complementing the lap-held is its big brother, the Bondwell 16. A transportable that includes a 10 Mb hard disc and integral modem (as well as full software) for £2250.

## Barbatan Limited

35 - 38 High Street  
Bristol BS1 2AW  
Tel: Bristol (0272) 213928

Attractive trade discounts are available.  
Dealer enquiries welcome.

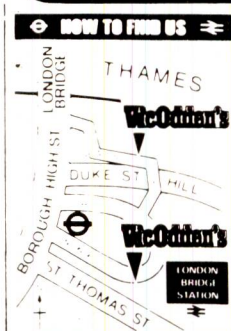


# VicOdden's

London's Computer Specialist  
Of London Bridge

## MEGADEALS

Trade-in your weeny 1/2K Hoity-Toity 3000 for the latest 30 Mega Thingy Quality Leap. We also buy Computers & Peripherals for CASH (If you can't put up with its superior comments having spent 24 hours playing 'The Hobbit' and getting .002%) We'll even take your sooper-dooper computer gear in part exchange for weird but wonderful Hi-Fi rigs, Walkpersons etc from our Lo/Mid/Hi-Fi store or against Niknok, Conan, Printax, Oilmouse cameras and 30,000mm lenses from our two photographic emporiums.

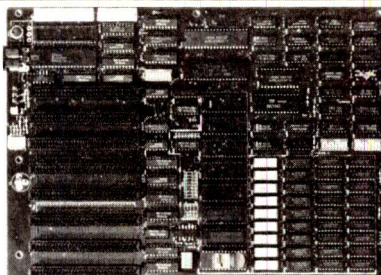


**6, London Bridge Walk, London SE1**  
**Tel: 01 403 1988**  
**Open 8.30-6pm**  
**Mon-Frid**  
**9am-1pm Sat**

**Go for the Best,  
Regardless of Cost  
EVEN IF IT'S CHEAPER**



**Dual  
processor  
speed  
4.77 MHz  
and  
7.00 MHz**



**The  
most  
advanced  
Mother  
Board  
available!**

- 640K (64K-640K selectable) RAM on-board w/parity check
- Hi-speed (7MHz!) 8088-2 CPU micro-processor w/8087 math co-processor optional
- 8K **TURBO** BIOS
- Full 640K RAM (maximum XT memory map RAM address) capacity
- IBM PC pinpoint compatible power connector
- 8 channel interrupt 8259
- 8 I/O slot XT standard
- 4 layer P.C.B. 2 rows of 256K RAM chips 2 rows of 64K RAM chips
- Same dimensions as IBM XT motherboard
- Full IBM XT compatibility
- 4 channel DMA 8237-5

### System Components



#### Add-On Power Supply

IBM Hard Disk replacement type, 140 Watt, New High Velocity Whisper Fan, will easily run 2 Floppys, Hard Disk and Tape Back-up . . . . . POW-1040-00



#### IBM Selectric Style Keyboards

These quiet alternative Selectric type keyboards will bring the features you have been wanting to a price you can't resist . . . . . KEY-1051-00



#### 5 or 8 Slot Cabinets

Grey/Beige, enamel finish, perfect fit for IBM PC or XT compatibles, all mounting hardware 5 Slot CAB-3065-00 . . . . . 8 Slot CAB-3068-00



#### PROM Laser by XOR

Hi-speed algorithms will burn 2716, 2722, 2732A, 2764 (in 52 sec), 27128, 27256 EPROMS under software control right in your PC . . . . . BOA-8640-00



#### Super 12 PAK Multifunction

Features Parallel Port, Serial Port, Game Port, Clock/Calendar, Expand to 384K, all cables, PrintSpooler and RAM Disk Software . . . . . BOA-6335-00



#### 7 PAK Multifunction

Features Floppy Controller, Parallel Port, Serial Port (optional 2nd Serial), Game Port, Clock/Calendar, RAMdisk, PrintSpooler . . . . . BOA-6250-00



#### Color Graphics Adaptor

Supports two levels of graphics and text in mono-chrome or color. Low resolution 320 x 200 pixel, high resolution 640 x 200 pixel . . . . . BOA-6200-00



#### Hi-Resolution Mono Graphics

This Hercules type board will run 1-2-3 software with a true full screen, high resolution of 720h x 348v pixels . . . . . BOA-6150-00



#### Hard Disk Controller

Handles 5 to 140 megabytes with minimum software configuration. Features DOS 1.1 & 2.0 compatibility, and ST-506 Interface . . . . . BOA-8050-00



#### Hard Disk Drives

10 Meg DRI-4200-00 40 Meg DRI-6630-00  
20 Meg DRI-4265-00 105 Meg (D,E,F) DRI-4250-00  
26 Meg DRI-6625-00 140 Meg (D,E,F,G) DRI-4270-00



#### 10 Meg Tape Back-Up

Inexpensive, reliable, on-board micro-processor that supports streaming or file-oriented. Uses Floppy Controller as Drive C . . . . . DRI-8080-00

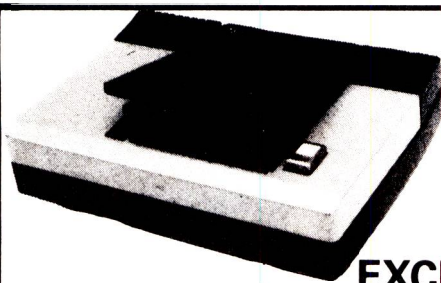
**Micro  
Products  
International**

**Call: Cynthia Clark  
(020) 45 26 50**

Building 70, 4th Floor  
1117ZH Schiphol-East  
The Netherlands

**Fax: (020) 41 81 29 Telex: 18306 TODAY!**





# MICRO LINK



## PROUDLY PRESENT THEIR EXCITING NEW PRODUCTS FOR YOU THE MSX USER

### HARDWARE

#### QUICK DISK DRIVE . . . £

The first real alternative to Micro-Cassettes..... **138.00**  
(Software now being developed for this Quick Access Drive).

#### PRINTERS . . . £

J.P. 100a (100CPS-80COL) **199.00**  
J.P. 130a (130CPS-80COL) **229.00**  
J.P. 136a (130CPS-136COL) **389.00**  
M.C.P. 80 (4 Colour Printer Plotter) **179.00**

Hardware prices are exclusive of VAT

Software prices are inclusive of VAT

Please tick the MSX Software required.

TELEPHONE: 0730-895296  
0730-895273

### SOFTWARE

#### TITLES . . . (incl. VAT) £

- ☐ ERIC & THE FLOATERS ..... **5.95**
- ☐ DRILLER TANKS ..... **8.95**
- ☐ BINARY LAND ..... **8.95**
- ☐ BEAN RIDER ..... **11.99**
- ☐ GHOSTBUSTERS ..... **11.99**
- ☐ MANIC MINER ..... **7.95**
- ☐ STOP THE EXPRESS ..... **6.95**
- ☐ DOG FIGHTER..... **6.95**
- ☐ NINJA ..... **6.95**
- ☐ JET SET WILLY ..... **6.95**
- ☐ ANT ATTACK ..... **7.95**
- ☐ HYPER VIPER ..... **7.95**
- ☐ SUPER DOORS ..... **8.95**
- ☐ NUTS & MILK ..... **8.95**
- ☐ MAH NONG CRAZE ..... **8.95**
- ☐ FIRE RESCUE ..... **7.95**
- ☐ SUBMARINE SHOOTER..... **8.95**

PICK ANY 4 TITLES AND GET 1 FREE

#### TITLE FREE £

- ☐ \_\_\_\_\_ No charge

### BEAMSTICK

FED UP WITH SPAGHETTI JUNCTION COMING OUT OF YOUR MSX? **MICRO LINK**

HAS SOLVED YOUR PROBLEM WITH THIS REVOLUTIONARY FAST ACTION, TWIN FIRE, INFRA-RED JOYSTICK ..... Circa! **39.95**

#### ONLY

JOYCARD..... **7.95**

☐ ORDER ☐ ENQUIRY

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Cheque/Postal Order made payable to:

**MICRO LINK**

Software £1.00 p&p (Total) £.....

Hardware £3.00 p&p (Total) £.....

**"BOWYERS", STEEP MARSH  
LISS, HANTS. GU32 2BJ**

## DISK FORMAT COPYING SYSTEMS

A full range of systems available to copy between different computer formats. Select the system that YOU require from our modular range.

### FEATURES:

Easy, user friendly commands

In-built library functions

Full support of bad side select (BBC)

After sales updating service

Over 100 disk formats supplied

Support for many different disk drives and types.

On-line help facilities

Interrogation/examination routines

On screen editing of data

Format any disk in the library

### COMPATIBLE WITH:

IBM PCDOS, MSDOS, TORCH/BBC CP/N, CP/M 80, CP/M PLUS, CP/M 86, MP/M, MP/M 86, CONCURRENT CP/M, CONCURRENT PCDOS, DEC RT11, TURBODOS and many others.

Software available separately for most MAP80, NASCOM and GEMINI computers.

### CONTACT:

# MAP 80 SYSTEMS LTD

UNIT 2, STONEYLANDS ROAD, EGHAM, SURREY. TEL: 0784 37674

ACCESS AND BARCLAYCARD ACCEPTED.  
CALLERS WELCOME BY APPOINTMENT.  
RING FOR FURTHER INFORMATION.



**TABS**  
Business Centres



**One stop.**

**OLIVETTI**

The M24 Personal Computer. £20.69 per week  
+ VAT over a 36 month rental period with a  
TABS RENTAL CARD.

Available from your nearest Business Centre or TABS Ltd, Dolphin House, New Street, Salisbury, Wilts. Tel: 0722-338668





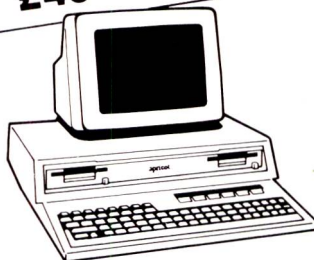
# MIR MICROCOMPUTER RENTAL

From Micro-Rent, Britain's top-value specialist in microcomputer rental.

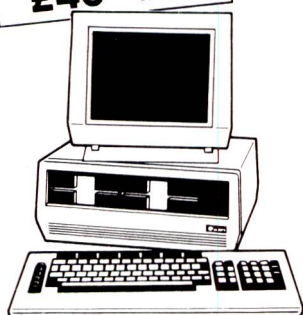
**MACINTOSH**  
**£40 \* PER WEEK**



**APRICOT**  
**£40 \* PER WEEK**



**SIRIUS**  
**£46 \* PER WEEK**



**IBM PC**  
**£46 \* PER WEEK**



- Try before you buy
- Flexible terms — weekly, monthly, annual
- No capital outlay/Immediate delivery
- Purchase option with rebate of rental

Micro-Rent is Britain's top-value microcomputer rental specialist. You can hire on a short term basis, and give the leading machines a thorough trial in your own office, before deciding on the right one for your needs.

If you already use a micro, Micro-Rent can supply additional machines for short-term projects, or to cover breakdowns. Extra printers or monitors also available.

Micro-Rent is independent of any manufacturer, and offers expert impartial advice on all aspects of microcomputer use.

**CALL TODAY 01-833 2531**

\* Prices quoted are based on 3-month rental, excluding VAT.



**OSBORNE  
IBM PC  
SIRIUS**

**APRICOT  
APPLE IIe  
LISA  
MACINTOSH**

**MICRO-RENT**  
**127 Cloudesley Road, London N1**

## MIR MICRO-RENT

# Try a Macintosh for a month!

**Micro-Rent makes it easy  
to try the world's friendliest computer.**

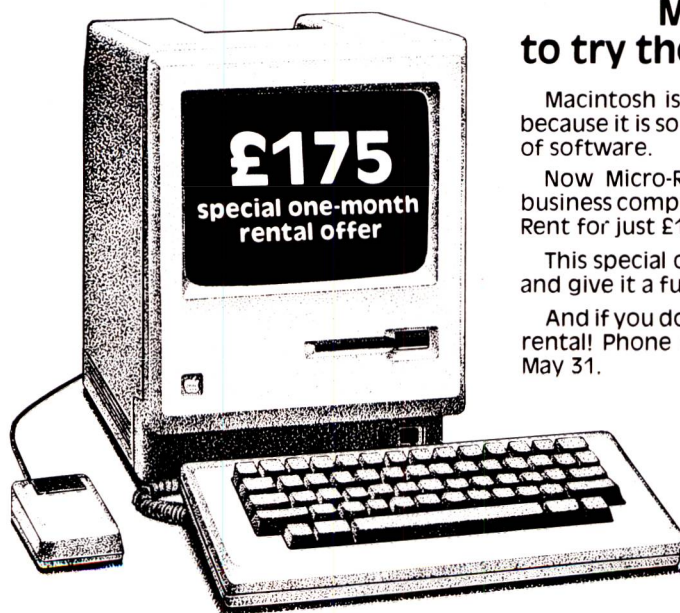
Macintosh is the personal computer that surprises everyone — because it is so easy to use, and so amazingly versatile with its range of software.

Now Micro-Rent makes your introduction to simple, fuss-free business computing even easier. Rent a Mac for a month from Micro-Rent for just £175 — including software!

This special offer lets you evaluate Macintosh in your own office and give it a full-scale trial before you decide whether to buy one.

And if you do decide to buy, Micro-Rent even refund your month's rental! Phone now — offer subject to machine availability, closes May 31.

**Micro-Rent, Britain's leading  
business computer rental specialists.**



Word processing



Graphics

**CALL TODAY 01-833 2531**



**MICRO-RENT** Authorised Apple Dealer.  
**127 Cloudesley Road, London N.1.**



## SUPPLIES SAVE £££'s

### SPECIAL OFFER

5 1/4" DISKS SS DD in **FREE LIBRARY BOX** ..... **£11.95**  
All prices inclusive of postage and packing

### 3M 5 1/4" DISKS LIFETIME GUARANTEE

PRICE £ PER BOX OF TEN

TYPE TPI	1BOX	2-4	5+
SS DD 48	15.50	14.20	13.50
DS DD 48	19.30	17.70	17.20
SS DD 96	23.10	20.90	20.20
DS DD 96	24.90	22.70	22.10

### NASHUA -5 1/4" DISCS 5 YEAR WARRANTY

SS SD 48	13.95	12.80	12.30
SS DD 48	14.75	13.70	13.10
DS DD 48	17.60	16-15	15.65
SS DD 96	18.65	16-95	16.45
DS DD 96	20.55	18-80	18.15

### 3 1/2" SONY -DISCS

SS DD 96	35.95	34.45	33.50
DS DD 96	49.85	45.40	43.90

All prices inclusive of postage and packing

### DISK STORAGE BOXES

10x5 1/4" SEE 10	2.50	2.30	1.95
30x5 1/4" REXEL	6.85	6.50	6.10
40x5 1/4" ABA LOCK-LID	14.60	13.80	12.75
90x5 1/4" ABA LOCK-LID	17.50	15.90	15.30
60x3 1/2" ABA LOCK-LID	15.50	14.50	12.70

### LISTING PAPER PRICE PER BOX OF 2000 SHEETS

11"x9 1/2"	12.60	11.90	11.20
12"x9 1/4"	14.95	14.20	13.30
EXACT A4			
70 GSM	18.15	17.25	16.30
80 GSM	22.35	21.05	19.75

**RING 0707 52698**  
ORDERS WITH CHEQUES PAYABLE TO  
**MICRO-MEDIA**  
RYDAL MOUNT  
BAKER STREET  
POTTERS BAR  
Herts EN6 2BP

**24 HOUR CREDIT CARD ORDERS 0707 50913**  
All prices please add VAT at 15%

**Access** **BARCLAYCARD VISA**

24 HOUR CREDIT CARD ORDERS 0707 50913

Micro-media Rydal Mount Baker St. Potters Bar Herts EN6 2BP

QTY NAME ADDRESS CREDIT CARD No. SIGNATURE

PRICE

PCW 6/85



## 1st IN BROMLEY

**BROMLEYS FIRST  
SPECIALIST COMPUTER STORE**

We are official Acorn Dealers with high standards to maintain and take pride in friendly and efficient advice and service.

See our extensive range of printers, monitors, disc drives, software and books.

## Data Store

6 Chatterton Road, Bromley, Kent. 460 8991

### LARGEST COMPUTER CENTRE

in

## MANCHESTER

**BBC, COMMODORE, MEMOTECH, SINCLAIR,  
SHARP, SANYO, AMSTRAD, QL, EINSTEIN, ADVANCE 86**

#### COMPUTERS

BBC 'B'	£339.95
BBC + DFS	£420.00
BBC +	£499.00
Amstrad (green)	£225.00
Amstrad (colour)	£325.00
Amstrad CPC 664 (green)	£339.00
Amstrad CPC 664 (colour)	£449.00
Advance 86B	Promotional Price
Apricot F1	£920.00 + VAT
Sanyo 555	£799.00 + Vat

#### PRINTERS

Shinwa CPA80	£219.95
Epson RX80 FT	£289.00
Juki 6100	£388.00
Cannon 1080	£319.95
Brother HR15	£385.00
Star Gemini 10X	£239.95
Star Gem 10G	Call
National Panasonic	£319.95
Taxan	£315.95
Smith Corona 80	£165.00

#### DISK DRIVES

Opus, Pace, Cumana, modems  
various  
Amstrad drives in stock

#### MONITORS

JVC Medium Colour	£199
JVC High	£249
Microvitec Medium (QL)	£275
Microvitec Medium (BBC)	£299
Ferguson MC101 (TV-Mon)	Call

#### BBC ACCESSORIES

6502 2nd Processor	£199
Z80 2nd Processor	£349
Bitstick System	£374
Graphpad	£143.75

#### COMPUTER FURNITURE IN STOCK

TELEPHONE ANSWERING MACHINES/CORDLESS PHONES: NOW IN STOCK

Wide range of books, software (Educational software specialist).  
Showroom, demonstration facility. Prices include VAT, all items  
available mail order. Personal Export scheme. Add £8 p&p if mail  
order. We accept Visa and Access  
Export dealer enquiries welcome



**MIGHTY MICRO**



SHERWOOD CENTRE  
268 WILMSLOW ROAD  
FALLOWFIELD, MANCHESTER  
TEL: 061-224 8117



# MM

# PC PRICE BONANZA

PROFESSIONAL SERVICE

EXPERT ADVICE

PROMPT DELIVERY

## PC's & COMPATIBLES

EX VAT

APRICOT PORTABLE 256K 1 x 720K Drive	£1295
APRICOT 256K 2 x 315K Drives & Monitor	£1295
APRICOT 256K 2 x 720K Drives & Monitor	£1545
APRICOT Xi 256K 10MB & Monitor	£2195
APRICOT Xi 512K 10MB & Monitor	£2595
APRICOT Xi 512K 20MB & Monitor	£2995
COMPAQ 2 2 x 360K drives	£1795
COMPAQ PLUS 10MB	£3195
ERICSSON 256K 2 x 360K Drives	£1645
ERICSSON 256K 10MB	£2695
MACINTOSH	£1495
OLIVETTI M24 256KB 2 x 360KB Drives	£1690
OLIVETTI M24 256KB 10MB	£2810
OLIVETTI M21 256KB 2 x 360KB Drives	£1590
OLIVETTI M21 256KB 2 x 720KB Drives	£1810

## EXTERNAL STORAGE DEVICES

PLUS 5 20MB + 5MB CARTRIDGE	£2325
PLUS 5 30MB + 5MB CARTRIDGE	£2845
PLUS 5 40MB + 5MB CARTRIDGE	£3059
CIPHER CARTRIDGE TAPE STREAMER	£795
SIMONS 20MB TAPE STREAMER	£895

## MEMORY BOARDS

128K MEMORY EXPANSION	£149
256K MEMORY EXPANSION	£219
512K MEMORY EXPANSION	£549
PC NET STARTER KIT	£795

## PC SOFTWARE

EX VAT

CAXTON CARDBOX	£165
DBASE II	£265
DBASE III	£325
DMS DELTA 4	£375
DMS +	£155
DR FORTRAN 77	£199
DR PASCAL	£250
DR ASSEMBLER Plus Tools	£125
FRAMEWORK	£325
FRIDAY	£135
KNOWLEDGEMAN	£380
LOTUS 1 2 3	£345
MICROSOFT WORD	£240
MULTIMATE	£295
MULTIPLAN	£125
MULTIUSER ACCOUNTS per Module	£295
OPEN ACCESS	£325
PEACHPAK	£150
PEGASUS LEDGER MODULE	£200
R. BASE 4000	£295
SAGE ACCOUNTS	£250
SAPPHIRE DATAMASTER	£395
SMART SOFTWARE SYSTEM	£495
SYMPHONY	£425
TK SOLVER	£245
VOLKSWRITER DELUXE	£235
WORDSTAR	£195
WORDSTAR PROFESSIONAL	£260
WORDSTAR 2000	£295

## PC PRINTERS

EX VAT

ANADIX DP-6500 500cps	£2295
DRE 8850 300lpm	£2065
EPSON LQ 1500 200cps (NLQ)	£895
HEWLETT PACKARD LASER PRINTER	£2895
JUKI 6300 40cps	£749
MANNESMANN MT180 160cps (NLQ)	£549
MANNESMANN MT400 400cps (NLQ)	£1595
NEC 2050 20cps	£625
NEC 3550 35cps	£955
NEC PINWRITER P2(P) 180cps	£535
NEC PINWRITER P3(P) 180cps	£595
OKI 84A 200cps	£645
OLI 2350 (P)	£1435
OLIVETTI DY450 45cps (P)	£765
PANASONIC KX-P1091 120 cps + NLQ	£269
QUIME 11/55 RO IBM 55cps	£1745
RICOH FLOWWRITER 1600 46k	£1349
TOSHIBA TH2100H 192cps (P)	£1350
TREND 930 200cps NLQ 80cps	£1350

## MAYFAIR MICROS

BLENNHEIM HOUSE, PODMORE ROAD,  
LONDON SW18 1AJ

TEL: 01-871 2555 / 870 3255

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

NEXT DAY INSURED COURIER DELIVERY AVAILABLE

## BIGGER STOCKS

**GARWOOD IS GROWING!**  
(and you can reap the benefit)

## CHEAPER PRICES

DISKS				DYSAN		3M		MEMOREX		BASF		HITACHI	
Price per box of 10			TPI	1-4	5-9	1-4	5-9	1-4	5-9	1-4	5-9	1-4	5-9
5 1/4"	S/S	S/D	48					15.60	14.70	14.60	13.70		
	S/S	D/D	48	17.25	16.20	15.10	14.20	17.10	16.00	17.60	16.50		
	D/S	D/D	48	25.30	23.70	20.70	19.40	20.60	19.30	21.50	20.20		
	S/S	Q/D	96	25.30	23.70	23.10	21.80	24.70	23.20	23.10	21.70		
	D/S	Q/D	96	31.80	29.80	27.00	25.30	27.40	25.70	26.80	25.20		
8"	S/S	S/D	48			16.80	15.75	19.80	18.50	15.20	14.30		
	S/S	D/D	48	24.70	23.15	21.75	20.40	20.80	19.50	20.00	18.80		
	D/S	D/D	48	29.30	27.45	25.05	23.50	27.10	25.40	23.80	22.30		
3" Compact (for the Amstrad Disc Drive)												36.00	33.80
3 1/2" Micro	S/S	D/D	135					41.80	39.20				

Disc prices are exc. VAT but inc. carriage. S/S = Single Sided D/S = Double Sided S/D = Single Density D/D = Double Density Q/D = Quad Density

RIBBONS supplied for most printers (including the Amstrad DMP1) Prices on Application

LISTING PAPER (plain or ruled) Priced per 1000 forms				Boxed	1-4 boxes	5-9 boxes	10+ boxes	Listing Paper prices are exc. VAT. Delivery free within 20 mile radius of Brentwood. Carriage at cost outside this area.
11" x 8 1/2"	1PT	60 gsm		2000	4.95	4.80	4.65	
11" x 8 1/2"	2PT	NCR		1000	14.45	13.95	13.45	
11" x 9 1/2"	1PT	60 gsm		2000	5.25	5.10	4.90	
11" x 9 1/2"	1PT	70 gsm		2000	6.00	5.80	5.60	
11" x 9 1/2"	2PT	NCR		1000	15.80	15.25	14.75	
11" x 14 1/2"	1PT	60 gsm		2000	7.30	7.05	6.80	

PRINTER OFFER - MT80 Matrix Printer 80 c.p.s. RRP £217 + VAT OUR PRICE £199 + VAT

COMPUTER COMPANIES formed with your choice of name - £85 + VAT (NO EXTRAS)

GARWOOD'S STATIONERY CATALOGUE - Full colour 224 pages - £1.75 inc postage



**Garwood (Wholesale) Limited**

45 Plovers Mead, Wyatts Green, Essex CM15 0PS ☎ Blackmore (0277) 823747





# JENTECH COMPUTERS OFFER

a 3 user multiuser multitasking computer and software

# TRIO 1

MOLECULAR COMPUTERS



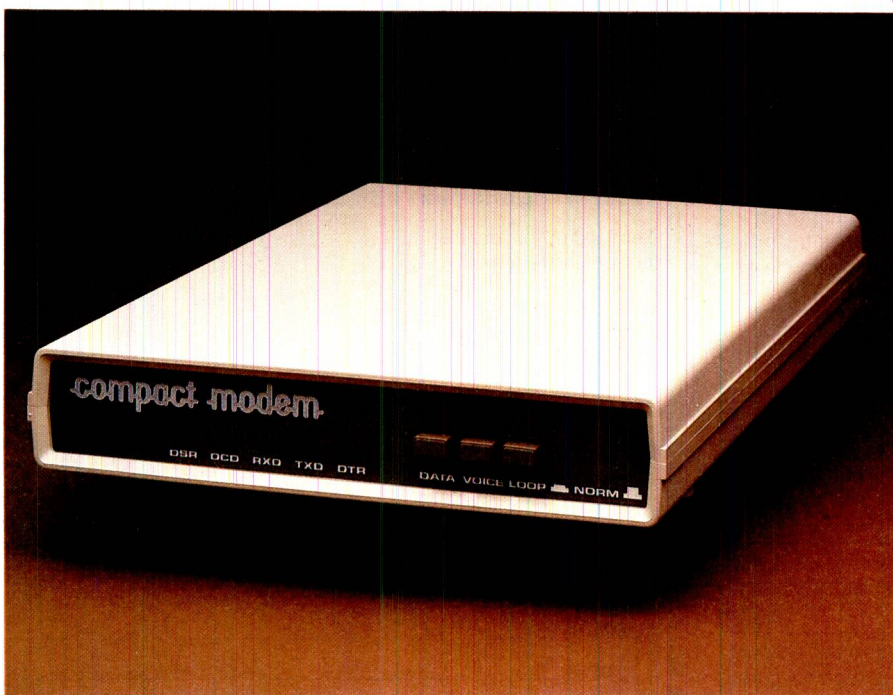
FROM **£3999**

EX. V.A.T.

## JENTECH COMPUTERS

## RELIABILITY FOR BUSINESS

## COMPACT SIZE, SPECIFICATION & PRICE



## MODEMS

**COMPACT £235**  
**COMPACT+£325**

EX VAT

DEALER & END USER ENQUIRIES

To Jentech Services Ltd.,  
FREEPOST  
Whitburn Street,  
Bridgnorth, Shropshire  
WV16 4QP.

From:-

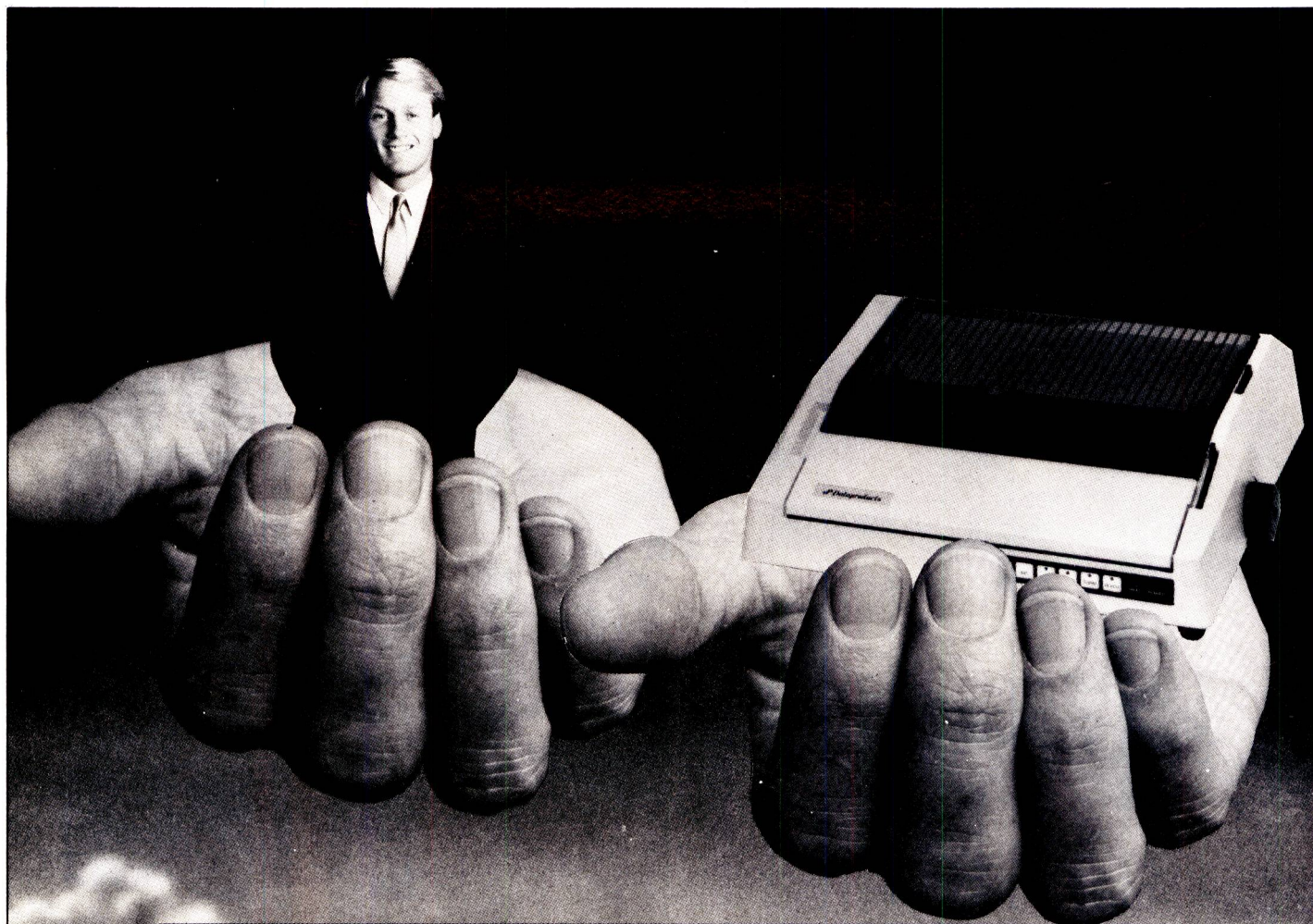
Company \_\_\_\_\_

Address \_\_\_\_\_

Tel: \_\_\_\_\_

Contact: \_\_\_\_\_





# **DATAPRODUCTS PRINTERS** **WITH A DIFFERENCE** **-FROM PERIMICRO**



Perimicro has every facility available to give you full supply, service and support on the superb range of 'Paper Tiger' dot matrix printers from Dataproducts — our dealership support with a difference.

Dataproducts, the unrivalled leaders in the professional printer market, have manufactured the highest standard of dot matrix printers available to micro users. The 'Paper Tiger' range allows you to offer these professional standard printers to your customers.

Features of the 'Paper Tiger' range include total flexibility, ultra reliability and exceptional value for money — three features that Perimicro can equally apply to themselves.

The 'Paper Tiger' range eats lesser printers alive. With multiple print speeds, high and low speed draft facilities and text or letter quality production — the choice is yours to satisfy any job, be it black and white or multi-colour. 'Paper Tiger' is also compatible with nearly all micros and is now the standard printer for the IBM 'AT'.

Perimicro's support is readily to hand. Further details of the 8010, 8020, 8050 and 8070 models and other larger Dataproducts printers are just a phone call away.

Perimicro gives a full 12 month no quibble guarantee on all products, including a permanent repair facility beyond the 12 month warranty period. And for dealers who require the service, we offer an on-site national field maintenance service for your customers. Dataproducts 'Paper Tiger' from Perimicro. The helping hand every dealer needs.




**perimicro**

Arkwright Road  
Reading  
Berkshire RG2 0LS

Telephone: Reading (0734) 875464

Send today, for your free copy of the Perimicro catalogue — you'll be able to find out how Perimicro can help your business.

 A member of the Sintrom Group of Companies



Please send me the full Perimicro catalogue and price list

POSITION \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

TELEPHONE \_\_\_\_\_



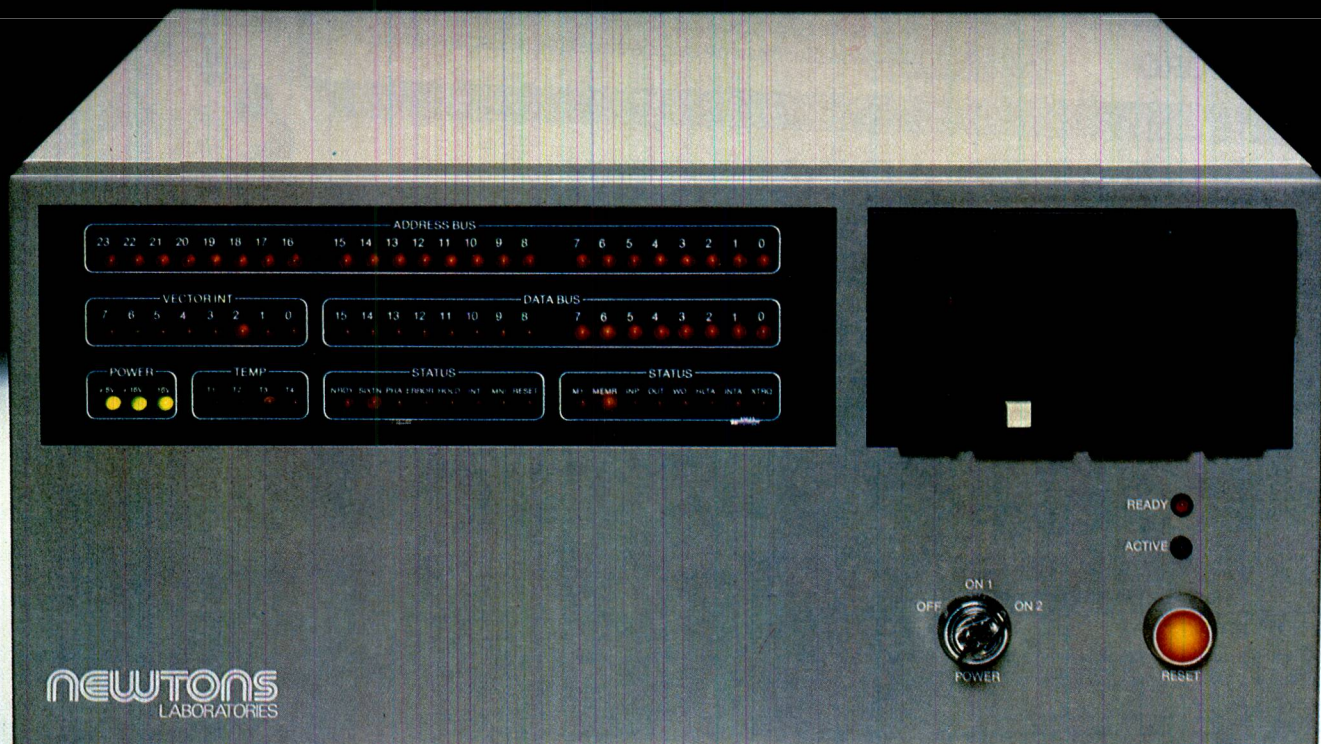


# ACCRON FASTNET

## THE HIGH SPEED NETWORK

"The fastest, most versatile, multi-user, multi-processor, micro computer system presently available!"

- Powerful 32-Bit Master Processor
- Up to 16 8-Bit and 16-Bit User Processors
- Multiple spooled and local printers
- Shared Hard Disks from 10-1200 MB
- 9 Track Magnetic Tape
- IBM & ICL Mainframe Communications
- Compatible with Mmm OST, DPC/OS and MP/M File and Record Locking



**NEWTONS**  
LABORATORIES

111/113 Wandsworth High Street,  
London SW18 4JB.  
Telephone: 01-874 6511.

I would like a Newtons representative to contact me ☐ I would like to see the  
ACCRON Fast/Net demonstrated ☐ I am especially interested in \_\_\_\_\_

NAME \_\_\_\_\_  
POSITION \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TEL \_\_\_\_\_

©All trademarks are recognised ©Newtons reserve the right to change specifications without notice.



Latest Programs from...

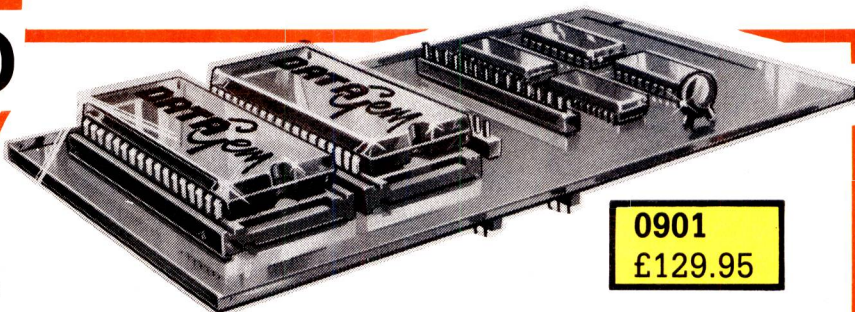
# GEMINI

Latest Programs from...

## BBC MICRO

# DATA

*GEMINI*



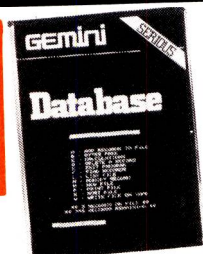
**0901**  
**£129.95**

The most advanced software ever written for the BBC Micro? Or just the most advanced and comprehensive Database Management System? Read this check list of main features, and decide for yourself!

- 24K ROM Based Random Access Database with 184 page manual.
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or Numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Allows up to 5100 User Definable Records with up to 62 fields per record and a maximum file size of 10 Megabytes.
- Permits just ONE file to exist over FOUR floppy disk drive surfaces.
- Offers a free format painted screen which scrolls 120x120, and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Customised Masking disk design service available for commercial and professional users.

**NEW  
IMPROVED  
DATABASE**

**BBC MICRO**



C.0101 Cassette £19.95  
D.0101 40 Track Disk £23.95  
80 Track Disk £24.95

Uses Machine Code to optimise the memory available and improve processing speed.

A very professional system, ideal for home, smaller business or educational requirements....

## INTEGRATED ACCOUNTING

for the BBC Micro.

Designed for the small to medium sized business user, where speed and efficiency are vital. Gemini Integrated programs are suitable for sole traders, partnerships or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capabilities for various disk drive combinations.

**£99.95  
per module**

**PRE-PRINTED...**

Continuous Invoices, Statements, Remittance Advices and Payslips available.

Demo Disk £5.00 refundable on the purchase of any module.

### Why Integrated Accounting?

Because it will retrieve information stored in one program for use by another and store data in one program which has been generated by another.

### Why Gemini?

Because our business software for the BBC Micro is based upon the solid foundation of experience. Not only are three of our Directors Chartered Accountants, but we have also successfully written business software for the BBC Micro since it was first launched.

**INVOICING & SALES LEDGER**  
Produces Invoices and Statements holds complete customer information - 135 on 40 track 610 on 80 Track.

**STOCK CONTROL**  
Full stock information for 980 part nos. on 40 Track or 1980 per 80 Track disk.

**NO  
SECOND  
PROCESSOR  
REQUIRED**

**PURCHASE LEDGER**  
Maintains complete file for each supplier - 135 on 40 Track or 610 on 80 Track disk.

**NOMINAL LEDGER**  
The central module which can also be used as a 'stand alone' Cash Book. Contains 143 Nominal Accounts, prints Profit & Loss Accounts and Balance Sheet.

**PAYROLL**  
Holds full employee information produces pay slips for 98 employees (40 Track) 198 (80 Track.)



## STOP PRESS...STOP PRESS

AMSTRAD titles now available — £19.95 each.

- C.1801 Gemini's most comprehensive cassette Database ever!
- C.1801 Report Generator: Interfaces with Database and allows merging of Database data into form letters, mailing labels, etc.
- C.1807 Home Accounts: A must for every home Amstrad user.





### 'Well, you've got to do something! — Clive and Sara

To Clive, without a wide circle of friends after his divorce, joining Dateline seemed 'logical', and to Sara, a single parent with little opportunity to make a social life, joining Dateline was simply a decision to 'do something about it'. When Sara first contacted Clive he was unavailable because he was already seeing another Dateline member regularly. Sara went out with a few other Dateline members, then Clive phoned her. Sara was quite taken with Clive on the phone — so much so that she invited him to her home for afternoon tea that weekend. 'When I met Sara I liked what I saw,' said Clive. 'We had tea and basically we started chattering, filling each other in on backgrounds, likes and dislikes.' Sara's two year old daughter, Helen, was also there and she was very taken with Clive. 'I watched her reaction,' said Sara. 'She thought he was wonderful. She sat on his lap from the moment he walked through the door. He seemed very truthful and open, and I thought he was very nice.' Clive drove away from that first meeting thinking what a very pleasant person Sara was. He had not made any arrangements to see her again, however, and he was also thinking how soon he could decently phone her to arrange another date without seeming too pushy. He decided to ring on the Tuesday, but Sara beat him to it — she phoned him on Monday! Sara and Clive's courtship started on their second date together. 'Halfway through the meal I began to think he was something special,' said Sara. 'Everything seemed to be there.' 'I was very attracted to Sara during that date,' said Clive. 'But I was determined not to rush into something and to really make sure of my feelings, but that happened very quickly over the next few meetings.' Clive proposed 'properly' — on bended knee — and Sara and Clive were married 5½ months after they first met. 'And the bride was numb with fear,' says Sara, laughing.



### 'The best thing I could have done.' John and Margaret — married.

As she was rather shy, one of Margaret's friends from work who had met and married someone through Dateline suggested she should join, and John joined as a last ditch effort to invigorate his social life before emigrating to South Africa. Both of them had quite a lot of dates with other people before they met. John laughs, 'I thought Margaret looked attractive, but I could see she was shy because she was blushing, so that gave me the upper hand straight away! We had such a lot in common, I definitely wanted to see her again.' It was virtually a case of love at first sight. 'I never really popped the question, we just sort of came to an understanding.' However, he did have to ask Margaret's parents permission to marry her. 'I was frightened to death. I sat there from 6.30 until 11.00 one evening, and then her father revealed he was half expecting a declaration anyway! John and Margaret met in May and were married the following December. Now four years and two children later they still think joining Dateline was the best thing they ever did!



'It took about a week to fall in love' Margaret and Michael — married. Within two weeks Margaret and Michael were talking about marriage. 'It might seem a little bit far-fetched, but we weren't prepared to settle for just anything to try to regain happiness. We both wanted something a little bit special, and thanks to Dateline, we've got it now.'

# WOULD YOU HAVE THE COURAGE TO JOIN **Dateline** for friends, love or marriage?

*If all your friends are married, you're not meeting anyone at work, you've moved to a new area or you are newly single again, joining Dateline is really just a sensible way of meeting lots of compatible people, and perhaps someone special ...*

## WHO JOINS DATELINE?

**People just like you!** Currently 2,000 people a month join Dateline, so you probably already know people who have used Dateline or met through Dateline. People who join Dateline come from all over the country — from farms, villages, market towns and cities. The problems of meeting people are not confined to any particular locality. The backgrounds and occupations of Dateline members are equally varied — MP's, surveyors, solicitors, engineers, doctors, journalists, teachers, secretaries, stockbrokers, nurses, chemists, receptionists, bus drivers and even zoo keepers. Loneliness is classless. What all Dateline members have in common is an optimistic, positive attitude in tackling the problem practically. Meeting someone special is difficult, but after that the romance is easy.

## WHY?

If the disco is not for you, your friends are all married, you don't meet anyone through work, you have just moved to a new area, or you are newly single again — just where do you begin? There really are very few ways you can meet the kind of people you want to meet. Dateline is simply the most honest and realistic way of being introduced to a wide choice of compatible partners. It also saves a lot of wasted time and expense!

## HOW DOES DATELINE WORK?

Forget fears of cold-hearted computers! You choose the sort of people you want to meet. When you join Dateline you will complete a very comprehensive questionnaire. Information from this will be locked into our computer memory, and the matching process, in which your data is compared with that of every Dateline member of the opposite sex, will begin. The most compatible matches will be found and their details forwarded to you. You will also be matched to other compatible people and they will contact you, and so a whole new social life begins.

*Dateline has been finding friendship, love or marriage for tens of thousands of people since 1966.*

## IS DATELINE SUCCESSFUL?

Many thousands of couples like those on this page, have met and married through Dateline. The Dateline questionnaire is designed to match couples through many facets of physical type, personality and life-style; not just matching those who want to meet people similar to themselves, but those who also want to meet someone different.

*If you think you would like to join the thousands of people all over the country who have been finding a new social life or love and happiness through Dateline, simply complete the questionnaire below. We will send you confidentially and completely free, full details about Dateline and how it works, and details of just one of the Dateline members who are compatible with you. Send to: Dateline Computer Dating, 23 Abingdon Road, London W8. Tel: 01-938 1011.*



**CONFIDENTIAL** **FREE**

## Computer Test to Find Your Ideal Partner

### 1 START HERE

Do you consider yourself:

- |                                            |                                       |
|--------------------------------------------|---------------------------------------|
| <input type="checkbox"/> Shy               | <input type="checkbox"/> Generous     |
| <input type="checkbox"/> Extrovert         | <input type="checkbox"/> Outdoor type |
| <input type="checkbox"/> Adventurous       | <input type="checkbox"/> Creative     |
| <input type="checkbox"/> Family type       | <input type="checkbox"/> Practical    |
| <input type="checkbox"/> Clothes-conscious | <input type="checkbox"/> Intellectual |

2 Indicate which activities and interests you enjoy by placing a '1' (one) in the appropriate box. If you dislike a particular activity, write a '0' (nought) in the appropriate box. If you have no preference, leave the column blank.

- |                                     |                                                          |
|-------------------------------------|----------------------------------------------------------|
| <input type="checkbox"/> Pop music  | <input type="checkbox"/> Politics                        |
| <input type="checkbox"/> Fashion    | <input type="checkbox"/> Classical music                 |
| <input type="checkbox"/> Pubs       | <input type="checkbox"/> Art/Literature                  |
| <input type="checkbox"/> Sport      | <input type="checkbox"/> 'Live' theatre                  |
| <input type="checkbox"/> Pets       | <input type="checkbox"/> Science or technology           |
| <input type="checkbox"/> Folk music | <input type="checkbox"/> Creative writing/painting       |
| <input type="checkbox"/> Jazz       | <input type="checkbox"/> Poetry                          |
| <input type="checkbox"/> Travelling | <input type="checkbox"/> Philosophy/Psychology/Sociology |
| <input type="checkbox"/> Cinema     | <input type="checkbox"/> History/Archaeology             |
| <input type="checkbox"/> Good food  | <input type="checkbox"/> Conversation                    |

3 I am over seventeen and would like you to send me completely free and without obligation a description of my ideal partner. Plus a free full colour brochure and lots more information about Dateline. I enclose two first class stamps.

3 Your sex ..... put M or F Your Height ..... ft ..... ins

Your Age yrs. Age you would like to meet Min. Max

Christian Name .....

Surname .....

Address .....

.....

Nationality ..... Religion .....

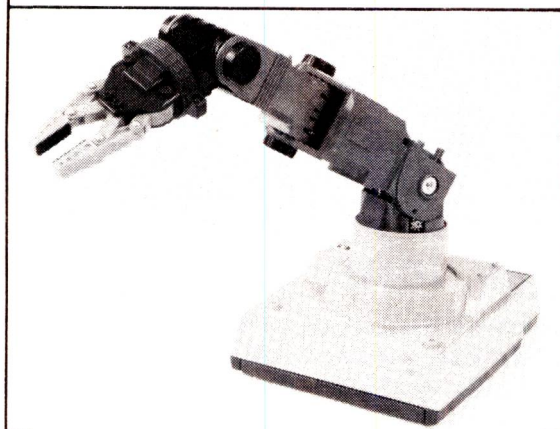
Occupation .....

Send today to:  
Dateline, Dept PCE  
23/25 Abingdon Rd  
London W8.  
01-938 1011

# Dateline



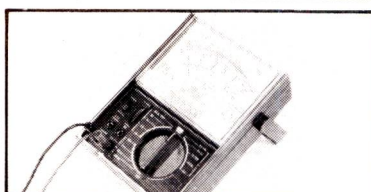
# Make more things happen with Memoco.



## Memoco Electron Robotic Arm

12 Axis of movement. Arm raise and lower. 270 degree rotation left or right. 90 degree Elbow movement left or right. 90 degree wrist movement either side of centre. 270 degree wrist rotation in either direction. Claw open and close. Fitted with motor control circuit. Switched from 5 volt TTL. Controlled by computer. Separate motor driver power supply.

With position feedback	<b>£129.95</b>	Spectrum Interface card	<b>£79.00</b>
BBC B Interface card	<b>£49.00</b>	Commodore 64 Interface card	<b>£49.00</b>



## Range Doubler Multitester 43 Ranges

50,000 Ohms per volt DC. 10,000 Ohms per volt AC. 4.25" Colour coded mirrored display giving accurate reading without parallax error.

Normal Price £27.00  
Our Price **£15.45**

## 200 in 1 Electronic Lab Kit

Includes all parts to make 200 projects such as Radio: Rain Detector: Burglar Alarm. Covers projects using Transistors: Integrated Circuits: Seven segment displays: Light Sensitive circuits and many more. All components built into fitted workcase with cover. Comprehensive manual. Completely safe.

Normal Price £34.00  
Our Price **£24.95**

## Ni-Cad Battery Charger

A.A., C., D and PP3. Charges up to five batteries at a time.  
Price **£6.95**

## Battery Eliminators

Mains to DC regulated 300 mA 6v, 7.5v, 9v selectable. Suitable for most battery operated equipment.

Price **£6.95**

## QuickShot II

Joystick **£9.50**

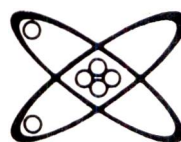
## 1½ - 4½ v DC Motors Stall Current 300 mA

Dimensions: Length o/a: 45 mm; Dia: 24 mm; Shaft length: 5 mm; Shaft Dia: 2 mm

Price - **£1.50** each or 10 for **£12.50**

ALL PRICES ARE INCLUSIVE OF VAT - FOR ORDERS UNDER £5 ADD £1.00 POSTAGE AND PACKAGING. FOR INFORMATION ONLY PLEASE SUPPLY S.A.E. TRADE ENQUIRIES WELCOME

# MEMOCO ELECTRON



15 WINDSOR STREET  
MELTON MOWBRAY, LEICS  
TELEPHONE (0664) 63544

# PHONE Action line FOR

## MATRIX PRINTERS

Mannesman Tally ■ NEC Pinwriter ■ OKI Microline ■ Epson ■ Digital Dataproducts Paper Tigers

## LETTER QUALITY AND LINE PRINTERS

Uchida ■ Dyneer ■ Brother ■ NEC Spinwriter ■ Dataproducts full range

## VDUs AND MONITORS

Televideo ■ Tatung ■ Digital ■ Hazeltine ■ Dyneer

## GRAPH PLOTTERS

Hewlett-Packard ■ Gould

## PLUS A FULL RANGE OF COMPUTER FURNITURE

GET ON OUR MAILING LIST - HUNDREDS OF GREAT BARGAINS EVERY MONTH

# MANCOS COMPUTERS

TRADE WAREHOUSE

Action line

01840 5666 061 861 0757

TOP-LINE CHOICE / BOTTOM-LINE PRICES

Mancos Computers, Unit 3, Albany Road Trading Estate, Manchester M21 1BH

# It's easy to complain about advertisements. But which ones?

Every week millions of advertisements appear in print, on posters or in the cinema.

Most of them comply with the rules contained in the British Code of Advertising Practice.

But some of them break the rules and warrant your complaints.

If you're not sure about which ones they are, however, drop us a line and we'll send you an abridged copy of the Advertising Code.

Then, if an advertisement bothers you, you'll be justified in bothering us.

**The Advertising Standards Authority.** ✓  
If an advertisement is wrong, we're here to put it right.

ASA Ltd, Dept 2 Brook House, Torrington Place, London WC1E 7HN

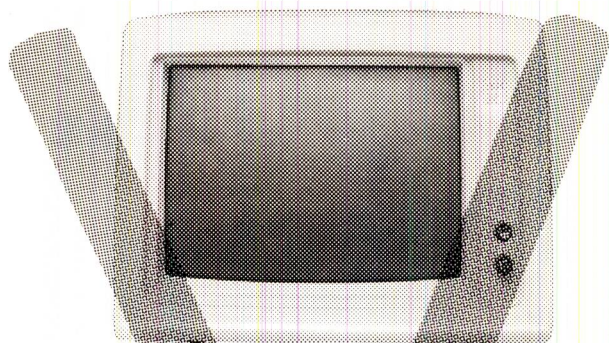
This space is donated in the interests of high standards of advertising.



---

# Some PC's just don't seem to add up.

---

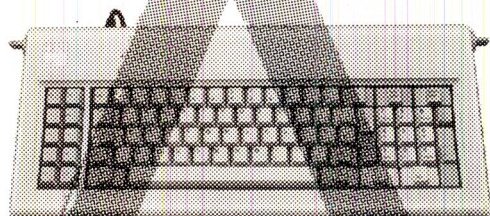


Mono Monitor £182.00+

Mono/Printer Adapter £177.00+



C.P.U. £2,952.00+



Keyboard £181.00+

Additional RAM £144.00+

DOS 2.10 £51.00+

**IBM XT\* 10Mb  
£3,684.00+ VAT**



**Victor VPC 15 Mb 256 K RAM  
£2,995.00**

The package comes complete with a 15 Mb Winchester drive at around one third less than the XT, ready to run (with mono screen) at £2,995 + VAT.

An industry standard micro with fully 50% more storage than the XT, more expansion slots and drive options, high resolution mono and colour monitors featuring tilt and swivel screens and last but not least a keyboard that's easy to understand and simple to use.

For more details contact Victor Technologies (UK) Ltd., The Valley Centre, High Wycombe, Bucks or telephone (0494) 450661.

---

## **VICTOR** Technologies

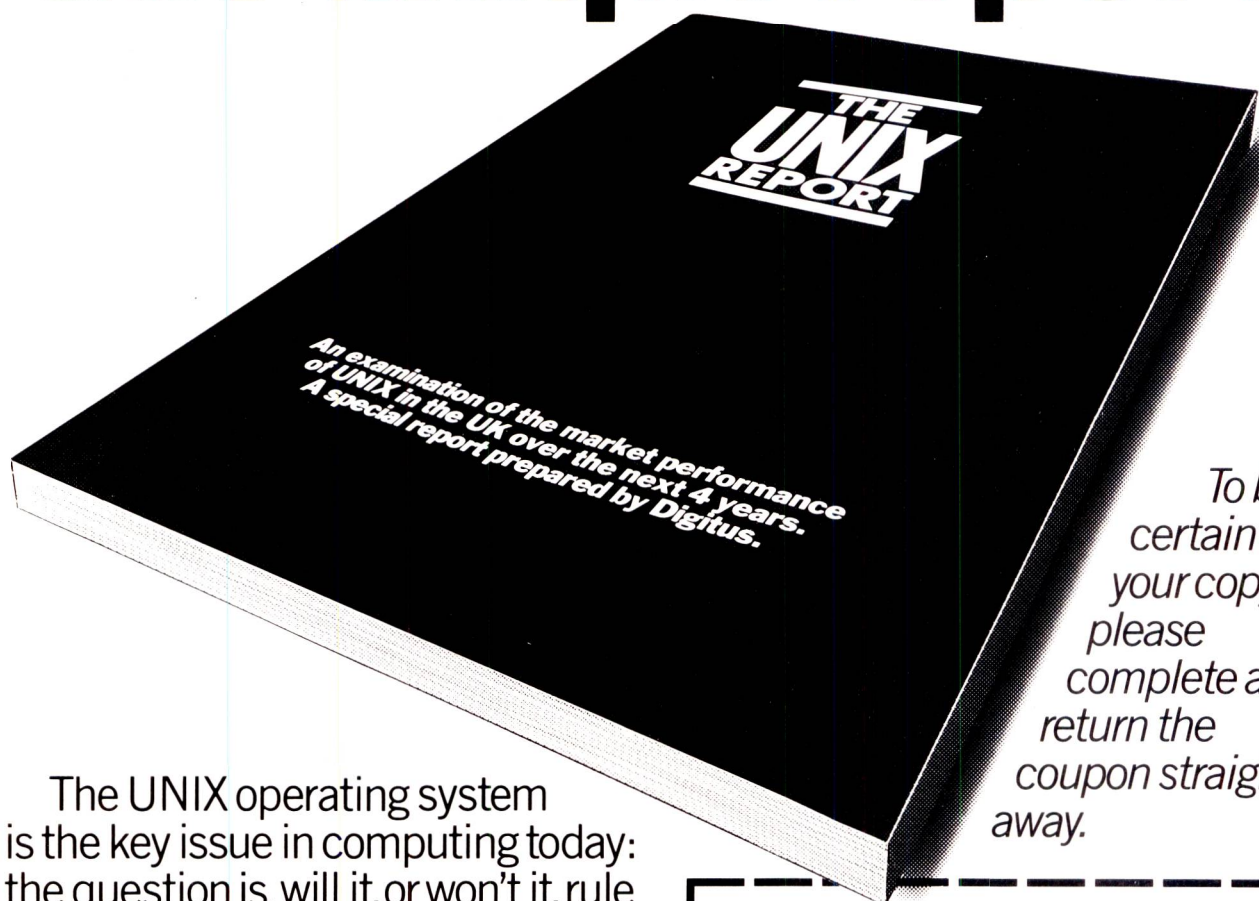
---

**We never forget you're human.**

\*IBM XT prices quoted at time of going to print.  
IBM XT is a registered trade mark of  
International Business Machines.



# Without any question, you need to send for this unique report.



To be certain of your copy, please complete and return the coupon straight away.

The UNIX operating system is the key issue in computing today: the question is, will it, or won't it, rule the multi-user world of the future?

If your company or organisation uses micro, mini or mainframe computers you cannot afford to be wrong about UNIX.

This exclusive report — based on unique information gathered from manufacturers and users alike — predicts the course of UNIX in the U.K. market over the next four, momentous years.

Please send me a copy of The UNIX Report. I enclose a cheque for £95, or debit my Access/Visa, account no. \_\_\_\_\_

Name \_\_\_\_\_

Company/organisation \_\_\_\_\_

Position \_\_\_\_\_

Address \_\_\_\_\_

Post to: The UNIX Report,  
Digitus, 10-14 Bedford Street,  
Covent Garden, London  
WC2E 9HE. Tel. (01) 379 6968.

**Digitus**

**UNIX**  
**YES OR NO?**



## Looking for the ultimate Word-Processor for your PC? Then get some LEX appeal Lex gives you:

### ★ POWER ★

Over 200 Editing Functions. Multiple rulers with independent column justification. User-definable data-base system and list processor.

### ★ SOPHISTICATION ★

Powerful 4 function programmable calculator with 20 memories, accumulators, bracketed expressions, coma, and V & H totalling. Cut & Paste system for multiple sentence, paragraph and column movement. Visible equivalent programming system with pause codes for automatic routines. Abbreviations for common text and frequently used key-strokes. Conditional document merge. Conditional command repeats. Automatic titles and footnotes, page and paragraph numbering. Optional spelling dictionary.

### ★ FLEXIBILITY ★

Multiple document and VDU formats. Customisable menus and forms. Individual users can run their own unique version of the system.

If you think LEX sounds appealing, contact **B.O. SVANHED** for further information. We offer a complete service including customised installation of LEX, training, Maintenance and support.

We can also supply a wide range of hardware, including the Columbia range of compatibles. e.g.:

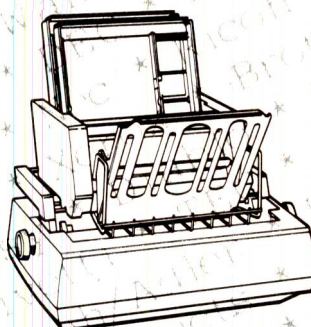
Mpc 4620, 256K RAM, 10Mb Fixed disk, 360K floppy, colour/graphics controller, 2 serial & 1 parallel ports: **£2915.00.**

**B.O. Svanheld, D4 Calthorpe Mansions, Calthorpe Road,  
Birmingham B15 1QS  
Tel: 021-454 1695**

LEX is a trademark of Ace Microsystems Ltd.

## Probably the best Sheet Feeder in the world

# BDT



From their U.K. Distributor

## EIT

Oaklands House, Solatron Road,  
Farnborough, Hants GU14 7QL  
Tel: (0252) 545164 Telex: 8589902

Phone (0252) 545164  
For details of your nearest stockist

### PEGASUS ACCOUNTING

Regarded by many accountants as the very best accounting software available. Pegasus comprises eight modules, most of which will operate alone or will work together in a totally integrated system. We have professional staff, in London and the Midlands, fully trained to install and support Pegasus. Prices and details on request. We are authorised Pegasus dealers.

### COMPUTER-AIDED DESIGN

As specialist consultants in this field we can supply either software only or a total system configuration with full support. We are suppliers of AUTOCAD, DOODLE and a number of other CAD packages. The productivity benefits of CAD are enormous – the cost of a system is almost certainly much less than you would expect. In most cases our clients have found a system pays for itself within 3 to 12 months!

### MULTISOFT ACCOUNTS

A system offering top-level functionality at a very reasonable price. Recent press reviews have highlighted Multisoft as one of the most powerful micro-based accounting systems currently available. We concur. Very impressive indeed! Please telephone for further information. We are officially appointed Multisoft dealers.

### CHIT-CHAT

The new telecommunications package from Sagesoft which we feel represents outstanding value for money.

- ★ Micro-to-micro file transfer.
- ★ Top of the range EMI Datatek modem.
- ★ Free subscription to Telecom Gold (worth £100).
- ★ Access to Viewdata and Prestel.
- ★ Electronic mail, telecommunications and telex.

List price **£399** our price **£325**

## BEST U.K. SOFTWARE PRICES?

**TRISOFT LTD. 0629-3021**

Whether you are seeking specialist advice or simply wish to buy your software at a competitive price we believe that Trisoft Ltd offers a service second to none. Apart from offering over 350 software packages, covering most machine formats, we are also dealers in ACT Apricot, Olivetti and North Star Dimension (IBM-compatible, multi-user), computers.

### NEW VERSION DBASE II £239 WORDSTAR PROFESSIONAL £265

LOTUS 1-2-3.....	£289	MULTIMATE V.3.3.....	£265
FRAMEWORK V.1.1.....	£325	DR C COMPILER.....	£225
DBASE III V.1.1.....	£325	MULTIPLAN.....	£145
SUPERCALC II.....	£145	OPEN ACCESS.....	£325
DMS DELTA 4.....	£375	ENERGRAPHICS.....	£265

\*\*\*\*\*  
★ **WORDSTAR PROFESSIONAL £399 £265** ★  
\*\*\*\*\*

\*Please note that the above prices are exclusive of V.A.T.  
\*Carriage is charged at £3.00 + V.A.T.

### SAGE ACCOUNTS £259 SAGE PLUS £495

\*We offer probably the widest range of software in the UK. Please ask for a copy of our comprehensive price list.  
\*Local authority, government and European enquiries welcomed. Further discounts may be negotiated for large orders.

## TRISOFT LTD

Crown Square, Matlock, Derbyshire DE4 3AT  
Telephone 0629-3021

### HARDWARE SERVICE

Please telephone for prices and details of our optional installation service. We supply:-

#### APRICOT

U.K.'s highest selling serious business micros; we supply the full range from the F1 to xi20s.

#### OLIVETTI

M21 and M24. In our opinion the Olivetti range offers the finest IBM-compatible, single-user hardware available.

#### NORTH STAR DIMENSION

The only 100% PC-compatible multi-user multi-processing system currently available. Will accept up to 12 work stations and runs all IBM "off-the-shelf" software. Tremendously cost effective as compared to IBM PC networks; up to 60MB central storage. Entry-level, 2 screen configuration with 15MB central storage only **£5875**, R.R.P.

#### SUPERCALC III

Here are just some of the features offered by Supercalc III Release 2 and why this program is likely to overtake Lotus 1-2-3 in total sales.

\*Price includes direct telephone support from Sorcim/IUS. \*Largest useable spreadsheet (up to 9999 rows and 127 columns) \*Advanced memory manager. \*8087 support for speed. \*Over 500 built-in functions such as rate of return, net present value, average, random number generator, trigonometric functions etc. \*Superb graphics including 8 font types, up to four charts per page and able to print all plotter colours. List price **£295** Our price **£199**

#### DISKS and BOOKS

We stock Sony, Dysan and 3M disks. Our prices are very competitive; for example 1 box of 10 Sony double-sided disks is £44.50 + V.A.T. + £1.00 carriage. We also sell computer books; please ask for a copy of our booklist.





## Seikosha. Advanced business printers for every size of business.

Whether you're in business in a small way or running a vast Multinational, you need the most advanced, reliable, high performance printer you can buy.

And that means Seikosha.

Because Seikosha produce a range of up-to-the-minute printers to suit everyone, from the smallest to the largest volume business user.

What all Seikosha printers share in common however, is an unbeatable combination of high speeds, superb quality printing (including NLQ), low noise levels and the most advanced multi-function features you'll find today.

Of course this is no more than you would expect from the "House of Seiko".

Take the BP 5420 for example.

Fast, quiet and designed for heavy duty use, it combines high speed quality print at 420 cps (draft) and 104 cps (NLQ) with an 18K buffer. For ease of operation all user controls, plus the selector switch

for the 8 built-in fonts, are located on the front panel of the printer. Parallel and serial interfaces are standard.

Then, exclusively for the IBM PC and compatibles are the BP 5420I and BP 5200I.

The BP 5420I combines most of the features of the BP 5420 printer with all IBM characters, symbols and graphics as standard. The BP 5200I operates at 206 cps (draft) and 103 cps (NLQ) and represents one of the best value printers of its kind on the market.

Finally, the compact SP NLQ printer series meets the needs of smaller businesses.

Available from all leading computer dealers. Distributed exclusively by DDL. For details of your nearest stockists contact:

**DDL**  
THE NEW FORCE IN DISTRIBUTION

5 King's Ride Park,  
Ascot, Berks. SL5 8BP  
Tel: 0990 28921  
Telex: 846303 DD LTD G.



## DUST COVERS



FOR ALL COMPUTER EQUIPMENT  
INCLUDING STACKED SYSTEMS.



**Crown Dust Covers**

CROWN HOUSE, STICKLEPATH, Nr. WATCHET,

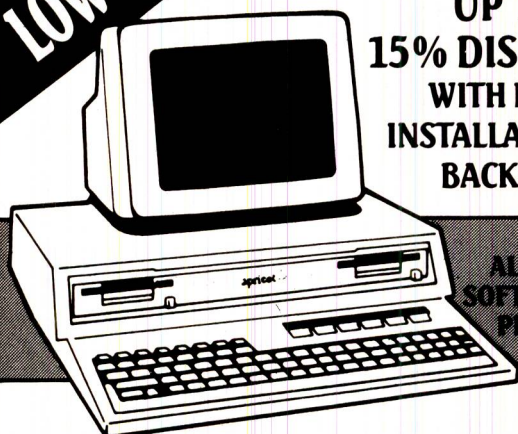
SOMERSET TA23 0LR

Tel: Washford (0984) 40888

**apricot  
SYSTEMS AT LOW,  
LOW PRICES FROM ALLIANCE**

**UP TO  
25% DISCOUNT  
CASH & CARRY**

**UP TO  
15% DISCOUNT  
WITH FULL  
INSTALLATION &  
BACK-UP**



**ALL MAJOR  
SOFTWARE AND  
PRINTERS**



**Alliance Computers**

Alliance Computers Limited Brookfields Industrial Park  
Werrington Peterborough PE4 6LA Tel: 0733 77100

# 'REPAIRCOVER'

MEANS

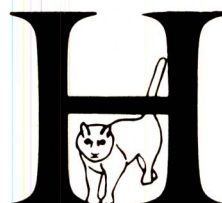
## LOW COST REPAIRS

WITH

## SPEEDY RESPONSE

- Significant **SAVINGS** compared to maintenance costs.
- **RESPONSE** within 24 hours from selected nationwide repairers.
- **HALSEY & COMPANY** have built up a strong relationship with 'Computer People' since 1981 with our exclusive insurance schemes including '**DATECOVER**'. Now the full advantages of '**DATECOVER**' are combined with 'repair response' under '**REPAIRCOVER**'.
- "All Risks" cover (including fire & theft) plus additional expenditure (e.g. data recovery cost) is included.
- The cost of '**REPAIRCOVER**' depends upon details of your system, location etc.

Contact us, or your dealer, for your  
'**REPAIRCOVER**' quotation.



**HALSEY & COMPANY**  
7 Passage Road,  
Westbury-on-Trym,  
Bristol BS9 3HN  
Telephone (0272) 503716

'The Insurance Brokers for Computer People'

CUT OUT AND KEEP FOR FUTURE REFERENCE



## PEGASUS PULSAR TABS

Apricot and Sirius/Victor **Fixed Assets** accounting using the new version of—

# ASSET MANAGER

Stand-alone system with direct entry of purchases and sales, or fully integrated with **Pegasus, Pulsar** or **TABS** accounting systems.

All the features and facilities of the original software **plus** many more.

Write or telephone for details, or contact your local dealer for details and a demonstration.



**BIMACS Limited**

Moor House  
Ratcliffe Wharf Lane  
Forton, Preston  
PR3 0AN  
Tel: 0524 792101

## York Computer Centre

### SPECIAL OFFERS!!!

Atari 800XL **£99.95**

Atari 1050 Disc Drive **£175.00**

#### Atari Cassette Package

Includes 800XL Computer, Cassette Recorder + two pieces of software.

ONLY **£129.00**

#### Atari Disc Package

Includes 800XL Computer,  
1050 Disc Drive,  
Home Filing Manager Disc,  
The Pay-Off adventure and demo disc.

ONLY **£249.00**

100's OF SOFTWARE TITLES IN STOCK  
Ring for availability of the latest titles.

Dropzone, US Gold. tape **£9.95** disc **£14.95**

Infocom series of Zork I, II, III disc **only £29.95** each  
Encounter tape **£9.95**

Scott Adams Adventure Series: **£7.95** each (cass.)

Enquiries welcome for any Atari requirements.

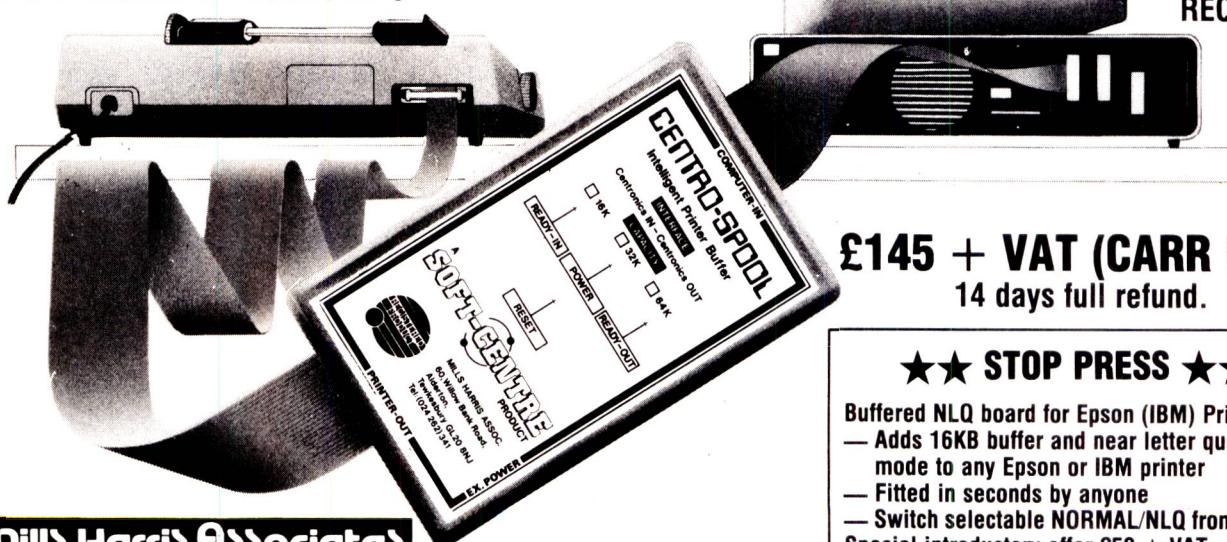
#### YORK COMPUTER CENTRE

7 Stonegate Arcade, York YO1 2QQ.  
Tel: (0904) 641862

# ALL PC's ARE NOT CONNECTED EQUAL...

## CENTRO-SPOOL 64KB BUFFERED INTERFACE CABLE

- At last, you and the printer can work together!
- Centro-Spool eliminates those costly hours spent waiting for the printer to complete printing.



FULL DATA  
SHEET ON  
REQUEST.

**£145 + VAT (CARR PAID)**  
14 days full refund.

### ★★ STOP PRESS ★★

Buffered NLQ board for Epson (IBM) Printer  
— Adds 16KB buffer and near letter quality mode to any Epson or IBM printer  
— Fitted in seconds by anyone  
— Switch selectable NORMAL/NLQ from outside  
Special introductory offer **£59 + VAT**  
14 days full refund

**Mills Harris Associates**

60 WILLOW BANK ROAD, ALDERTON,  
TEWKESBURY GLOS. GL20 8NJ TEL: (024 262) 341



# Is the Information Revolution Passing You By?

If you use an Apple, IBM, BBC or ACT micro then you could be missing out on the information revolution of the decade. Today there are literally hundreds of databases worldwide, which can be accessed by a microcomputer fitted with a Nightingale modem and using appropriate software. These data bases include Prestel, Micronet, Homelink, Telecom Gold, various 'Bulletin Boards' and massive American Databases such as 'DIALOG' and 'The Source'. Micros can also be used to send telex messages.

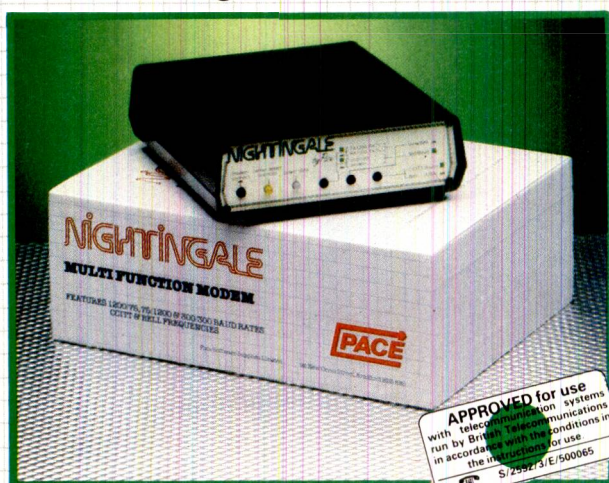


## NIGHTINGALE-The Modem

By far the most versatile modem available, at the price, for either home or business use, Nightingale will enable your micro computer to send and receive data utilising an ordinary P.O. Telephone Line. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) alongside 300/300 baud full duplex for communication between computers.

The state-of-the-art modem chip technology employed in Nightingale requires minimum support circuitry resulting in low power consumption, low cost, high quality and extreme reliability. It also features a simple self test facility for easy installation.

Nightingale complies with the vigorous specifications laid down by British Telecom and is fully BABT approved.



A world of information is available to you now when you install the Nightingale modem from Pace. There are hundreds of thousands of 'pages' of data available on Prestel, free computer software on Micronet, homebanking facilities available with Homelink, Company facts, Educational information, magazine and news articles available with Knowledge Index and the ability to communicate with other micro users direct, or via 'bulletin boards'.

**The Nightingale modem is only £136.85 inc. VAT.** If you do not already have suitable communications software Pace can supply this complete with a manual and full installation instructions.



"Bringing tomorrow a little closer"

**PACE SOFTWARE LTD.**  
92 NEW CROSS STREET,  
BRADFORD. BD5 8BS  
Tel. (0274) 729306  
Telex 51564



### SPECIAL INTRODUCTORY OFFER

For a limited period, when you order the Nightingale modem you will receive discount vouchers entitling you to the following:-

#### KNOWLEDGE INDEX

**20% discount off standard enrolment fee (normally £25)**

This remarkable collection of databases includes over 22,000,000 items covering Agriculture, Books, Business, Electronics and Computing, Corporate and Company News, Education, Engineering, Government Publications, Legal Information, Magazine Articles, Mathematics, Medicine and News/Current Affairs (The enrolment fee also includes 2 hours of free access time).

#### ONE TO ONE

**50% discount off standard enrolment fee (normally £50)-**

One to one is an electronic message service designed to give you the communications capabilities of a telex at much lower cost. By using your micro fitted with a Nightingale modem you can produce telexes, letters, reports and contracts, and send them in seconds to any destination. Courier delivery, priority mail and radio paging are also included in this highly efficient communications service.

To Pace Ltd., 92 New Cross Street,  
Bradford BD5 8BS

Please supply:

- ☐ modems at £136.85 inc. VAT & carriage
- ☐ modems & software pack for BBC micro at £159, inc. VAT & carriage
- ☐ modems & software pack for Apple II/IIe at £279 inc. VAT & carriage
- ☐ modems & software pack for IBM PC\* at £269 inc. VAT & carriage
- ☐ modems & software pack for ACT at £269 inc. VAT & carriage

Name .....

Address .....

Cheque enclosed £..... or please debit my Access ☐

Barclaycard ☐ (Please tick)

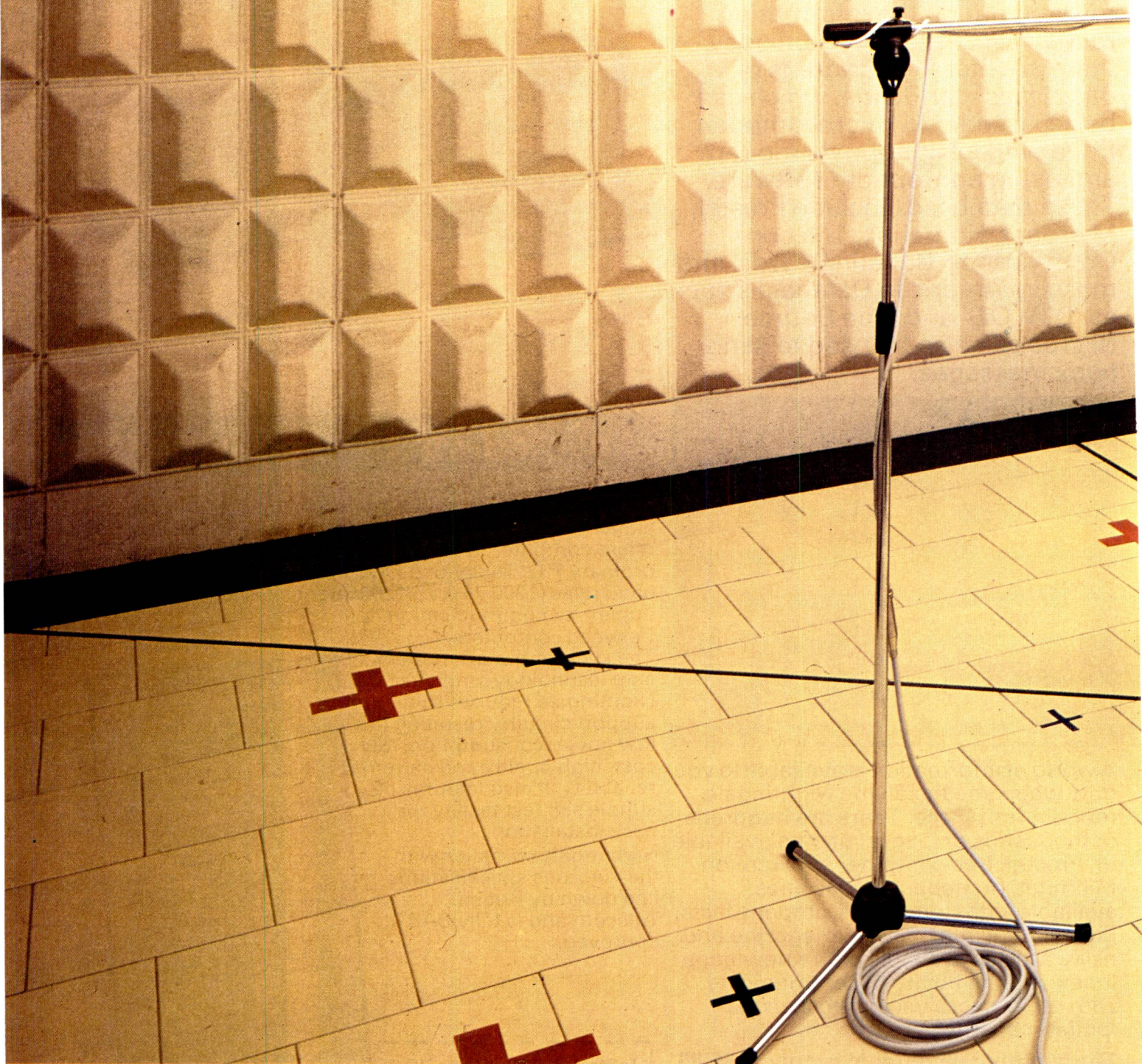
If you require further information on the above communications products for other computer systems, please write enclosing a stamped addressed envelope.

\*Assumes IBM micro fitted with RS 232 interface.

Please allow up to 28 days delivery.



# Honeywell the printer every computer



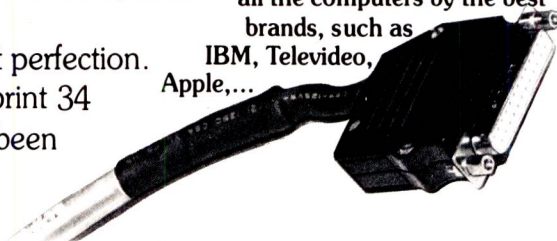
**34 CQ Printer : Standard serial and parallel interfaces. IBM, Epson and Diablo protocols. Fast draft speeds (up to 270 cps) and superior correspondence quality printing selectable at the touch of a button. Integrated single sheet feeding and automation sheet feeder option.**

Everyone has a right to seek out perfection. And every Honeywell Compuprint 34 CQ in concept and design, has been

subjected to the most severe technological evaluation in the search for perfection. High speed and quality in printing can be taken for granted. And the printer itself has experienced every stress possible to confirm

its durability, product quality and reliability. It goes without saying that a Compuprint 34 CQ can print in different fonts and characters and can produce "high quality print" to

Connectable with  
all the computers by the best  
brands, such as  
IBM, Televideo,  
Apple,...





# Compuprint: would love to have.



a high standard of definition. The most demanding tests have proved its flexibility and quiet operation and its compatibility with any computer. That's why everyone would love to have such a printer, since perfection is everyone's goal. For further information on Honeywell Compuprint printers: Honeywell Information Systems Italia Matrix Printers Operation Maxted Road

Hemel Hempstead  
Herts HP2 7DZ  
Tel. 0442/42291  
Tlx 82413  
Compuprint Printer:

**Together, we can find the answers.**

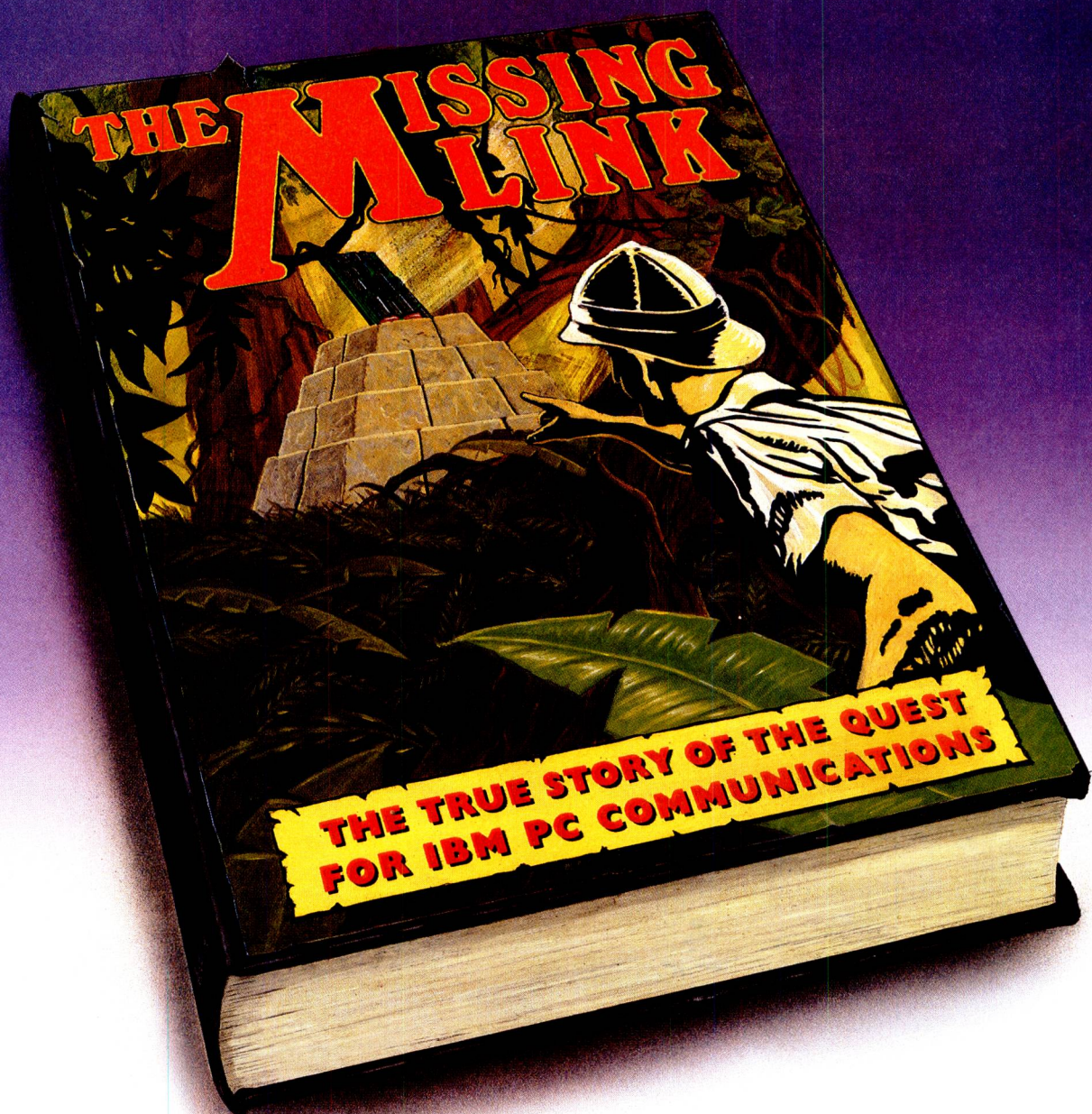
**Honeywell**

Honeywell Information Systems Italia

designed  
well,  
built well,  
"Honeywell"

HONEYWELL COMPUPRINT  
THE COMPUPRINT  
LA STAMPANTE CHE TUTTI  
I COMPUTER VORREBBANO  
COMPUPRINT HONEYWELL  
L'IMPRIMANTE QUE TOUS LES  
ORDINATEURS AIMERAIENT POSSÉDER  
COMPUPRINT HONEYWELL  
MATRIXDRUCKER DER DRUCKER  
DEN ALLE COMPUTER GERNE HATTEN





# The search is over.

At last, the only complete, BAPT approved communication's package for IBM® PC, XT, AT and compatible micros. 'The Missing Link' is an internal modem which



APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

comes complete with a menu driven software package allowing auto-dial/ auto-answer access to private and public VIEWDATA and DATEL services such as PRESTEL®,

TELECOM GOLD®, PSS, ONE TO ONE and many more.

The British designed 2/3 size card plugs into any of the expansion slots and offers CCITT V.21 300/300 and V.23 1200/75, 75/1200 full duplex with selectable error detection and correction protocols.

The Missing Link is available from Jaguar Communications (0727 32983), Interface (0256 461191), K.P.G. Hardware (01 995 3573), First Computer (01 499 3046), and IBM Dealers at a price of £499+ VAT.



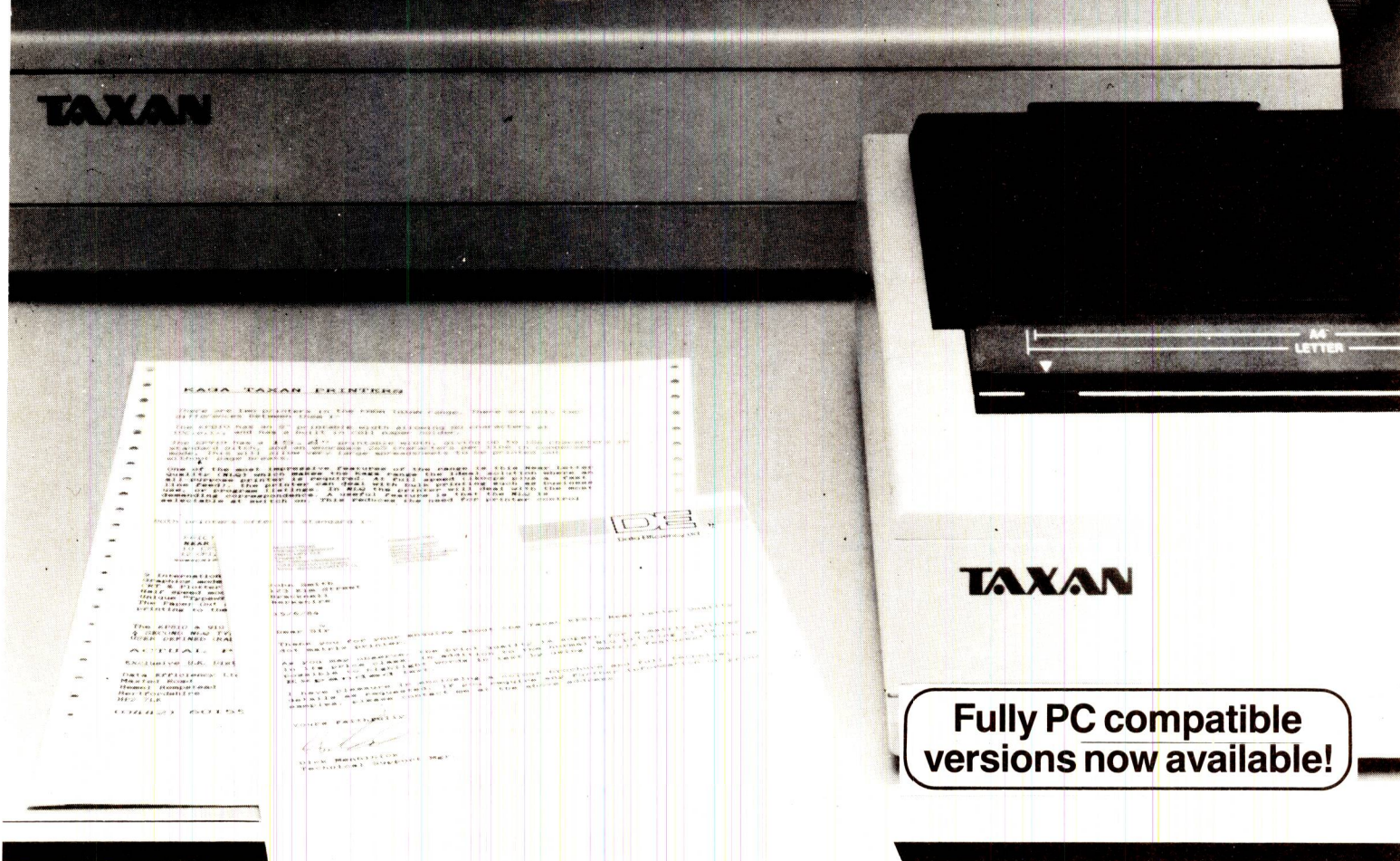
For further information contact PC Communications Ltd., Business and Technology Centre, Bessemer Drive, Stevenage, Herts. SG1 2DX. Tel: Stevenage (0438) 316561. Telex 825824



IBM is a registered trademark of International Business Machines. Prestel and Telecom Gold are trademarks of British Telecommunications.



# Now you need not pay through the nose for a good face!



**Fully PC compatible versions now available!**

Because Taxan dot matrix printers combine quality, value for money and proven reliability.

## Print Quality

Both the KP810 and KP910 have all the standard features found in dot matrix graphics printers, but when it comes to Near Letter Quality (NLQ) printing both really excel – producing output equalling or exceeding the quality of much higher priced units.

## Features

- \* 140 cps print performance
- \* NLQ double pass printing
- \* Downloadable character sets (DRAFT standard, NLQ optional)
- \* Wide choice of optional NLQ typefaces available in ROM
- \* Unique incremental printing mode
- \* Friction and tractor feed
- \* Standard Centronics interface (serial option available)
- \* Fully compatible with all popular software packages including Lotus 1-2-3, Applewriter, Wordwise etc.

\* KP910 prints extra wide – 156 char/line (normal) and 265 char/line (condensed) – ideal for Spreadsheets

## Value for money

<b>KP810</b> (80 column)	around £339 (plus VAT)
<b>KP910</b> (156 column)	around £429 (plus VAT)

## PC compatible versions

<b>KP810PC</b> (80 column)	around £399 (plus VAT)
<b>KP910PC</b> (156 column)	around £499 (plus VAT)

Prices correct at time of press

Distributed exclusively to dealers nationwide by DDL.  
Call us for the address of your nearest stockists.



**THE NEW FORCE IN DISTRIBUTION**

5 King's Ride Park,  
Ascot, Berks. SL5 8BP  
Tel: 0990 28921  
Telex: 846303 DD LTD G.



# MICROTIME INTERNATIONAL LIMITED

106A BEDFORD RD, WOOTTON,  
BEDS MK43 9JB  
Telephone (0234) 767758/766351

## NEC PC-8201A

### From Tokai Create

**PASOCALC** — ROM based spreadsheet (NEC) £80

### From A.M.P. Incorporated

Forth £90  
The Journalist — Unique text formatter with graphic layout display £65

### From Travelling Software Inc.

Travelling Writer — acclaimed word processor £50  
Time Manager — time costing for professionals £55  
Appointment Manager — calendars & appointments £50  
Sales Manager — sales activity/customer notes £55  
Expense Manager — full expense accounting £55  
Project Manager — budgets/actuals/costs/activities £60  
T-Base — the ultimate relational database system £90  
T-Backup — advanced tape filing utility £25  
IDEA! — the revolutionary outline processor £75

### From Chattanooga Systems

Autopen — full featured word processor £30  
Autopen N&A — as above with name/address options £40  
Autopad — a small memory (5K) spreadsheet £40  
Trip — expense account details and trip log £30  
ChequeBook — personal cheque book record £25  
Book — single entry accounts package £30  
Tfile — tape filing utility £20

### From Datacount Inc. (NEC only)

Data-Dex — automated desktop card index system £35  
Data-Text — text formatting and word processor £40  
Data-Code — bar code generation package £30  
Data-Max — database, any record in 0.5 seconds £50

### From Silicon Crafts/Micro Time

PUFS — our best cassette based spreadsheet under 7K £50  
MPLAN — spreadsheet with templates £50  
MSOLVE — equation solver with templates £50  
MBRAIN — full RPN calculator with stacks/memories £20  
MLABEL — general purpose labelling program £30

### From Custom Software

80C85 Assembler — (in 3K machine code) £40  
CBUG 80C85 Assembler De-Bugging tool £35  
(all prices ex-VAT, 50p per item UK p&p, 2nd class post)

**SEND OR RING FOR DETAILS  
TODAY FROM MICROTIME**

Approved NEC PC-8201A dealers



AUTHORISED DEALERS  
FOR TELEVIDEO • EPSON  
HEWLETT PACKARD •  
CONTROL DATASET ETC

### THE IBM STORY

Beginning to Grow	— Added Memory Chips 64K	£41
	— Memory Boards 128K	£183
	— PC Express 128K	£590
Growing Faster	— High Speed Memory 10mb + 5 removable	£3100
Share Facilities	— Idea Net, once only software	£350
	Board per machine	£450
	— 2 way switches for Printers	£115
Looking For Colour	— Microvitec Colour Monitor	£360
	— Mylex Colour Card	£450
	— High Resolution Pluto card	£900
Mainframe Comms	— Idea 3278	£750
	— Irma 3278	£1000
	— Idea 5251 for System 34/36/38	£850
Building Services	— You need Autocad, Drawing on 127 layers, down to phone no. on telephone	£700
Design, Asset	— PC Mouse for ease of input	£225
Control Personnel	— Modems, BT approved internal board	£450
Need to Talk	— Telex facility Braid manager	£1800
Need to Print	— Matrix Epson FX80	£360
	— Daisywheel Brother HR15	£380
	— Near letter quality CDC 80 col	£495
	— High speed, Philips GP300-2	£1890
Print Sideways	— 6 type sizes with sideways	£48
Improve Graphics	— Graphix Partner	£98
	— Graphwriter	£485
Presentation	— Polaroid Palette Slides from screen	£1060
	— Execuvision Slide Library	£280
Software	— Prokey, Write Macros, Reformat keyboard	£85
Accessories	— Spotlight	£85
	— Sidekick A Notepad, Calc, Calendar	£48
Disk Storage	— In Locable Box's for 100	£17
	— Unibox flip storage — 80	£13
Unwind and Relax	— Microsoft Flight simulator	£45
	— Night Mission Pinball	£30
	— Zork	£30

Daystar is at your service with a vast product range covering Disks, Vertical Market and Standard Software through to Cad/Cam Systems

### DAYSTAR COMPUTERS LTD

Unit 3 Diplocks Buildings, Diplocks Way, Hailsham, Sussex BN27 3JF.  
Please Tel. 0323 845130

# !eTInummoJ

## ... reflect on this ...

### LOW COST COMMUNICATION IS HERE

Imagine having ten branches scattered throughout the UK.

Imagine having to distribute updated error-free information consisting of one hundred words to all of them once a week.

Imagine having to do this within a communications budget of 100 seconds of telephone time.

Now imagine you've got no computer expertise in your office.

**It can be done.**

**And we haven't even begun to describe the system.**

Contact: **CommuniTel Ltd**  
189 Freston Road  
London W10 6TH

for further information or a demonstration.

# CommuniTel



## DUST COVERS SETS For AMSTRAD CPC 464 £6.95

\* Matching proofed nylon, treated with anti-static inhibitor. Green piping on monitor cover; AMSTRAD CPC 464 on keyboard cover.  
\* Please state Colour or Mono.

### Cover for other computers

Matching proofed nylon with toning piping and name on keyboard: BBC, DRAGON, £4.95, COMMODORE, GOLDSTAR, SANYO, SONY, TOSHIBA £3.95. In black but unpiped: SPECTRUM plus £2.50, QL £2.95.

### Matching covers for Printers

Amstrad DMP-1, Canon PW 1080A, Commodore MPS 801, Epson FX-80, RX-80, Mannesmann MT-80, Panther DX 109, Shinwa CP-80, CPA-80, Seikosha 500, Taxan KP810 £3.95, Brother HR5 £3.50 and Juki 6100 at £4.50.

ALSO AVAILABLE: Monitor, disc drives etc. and good range of Business Computer covers eg IBM-PC, Apricot, Macintosh. Please enquire.

### BBD COMPUTER DUST COVERS

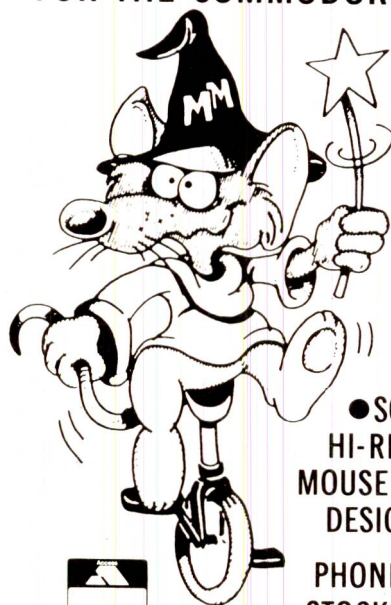
39 MANSE AVENUE  
WRIGHTINGTON WN6 9RP  
Telephone: 0257-422968

**TRADE ENQUIRIES WELCOME**

# Connexions Magic Mouse

FOR THE COMMODORE 64

**£59.95**  
INC. VAT.



- CREATE HI-RES GRAPHICS
- TRANSFORM YOUR OWN PROGRAMS
- COMES COMPLETE WITH DISC AND TAPE SOFTWARE - NO EXTRAS REQUIRED
- SOFTWARE INCLUDES HI-RES GRAPHICS PACKAGE, MOUSE CONTROLLER, SPRITE DESIGNER, ICON DESIGNER.

PHONE FOR YOUR NEAREST STOCKIST TEL: 01-441-1282

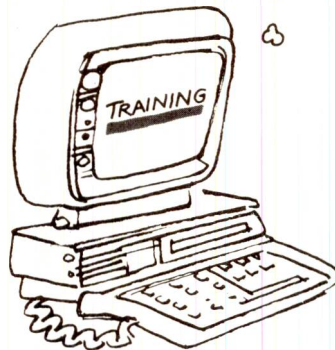
ANOTHER CONNEXIONS PRODUCT FROM:

SMC SUPPLIES, 11 WESTERN PARADE, GREAT NORTH ROAD, BARNET, HERTS EN5 1AD Telex: 295181 SMC G

## EDUTEXT

TUTORS IN WORD & DATA PROCESSING

DBASE III	WORDSTAR
LOTUS 1-2-3	WORDSTAR 2000
SUPERCALC	WORDCRAFT
FRAMEWORK	MULTIMATE
SYMPHONY	DISPLAYWRITE 2
EASYWRITER II	SPELLBINDER



FOR TRAINING AT OUR CENTRE, OR IN YOUR OWN OFFICE  
CONTACT HESTER BOYD-CARPENTER

SUITE 331/332 COLLEGE HOUSE WRIGHT'S LANE LONDON W8 5SH  
TELEPHONE 01-937 8633 01-385 6261

### ALDOS 486 Series

from £7695.00

- Entry level XENIX System
- up to 4 terminals
- 0.5 Mbyte RAM memory
- 20 Mbyte Hard Disc
- one networking port
- 80168 8 Mhz processor
- includes one ALTOS terminal
- 1 floppy drive
- 5 serial ports
- XENIX 3.0 runtime included

The ALTOS 486 is a cost effective XENIX system with a wide range of database, communications and applications software available. ALTOS Teamnet is supported via the networking port for expansion. Ask about PC PATH for adding your IBM PC to the ALTOS network.

### ALDOS 586 and 986 series

from £9235.00

- 10 Mhz 8086 based systems with XENIX 3.0 operating system
- up to 1 Mbyte RAM memory
- up to 80 Mbyte Winchester
- Low cost ALTOS Teamnet
- One Altos terminal included
- up to 9 users
- cartridge tape backup
- Ethernet
- 1 floppy drive

The ALTOS 586 and 986 series offers high performance, and a wide range of applications, database and communications software. ALTOS Teamnet supports transparent networking for distributed databases, Telex and 3270 and 3280 communications. Enquire about PC PATH to integrate ALTOS and IBM PCs.

### ALDOS 68000 Series

from £12,450.00

- Motorola 68000 processor
- up to 16 users
- -1 floppy drive
- Multibus expansion
- ALTOS-NET or Ethernet
- UNIX III
- up to 160 Mbyte Winchester
- cartridge tape backup
- Large memory space

The ALTOS 68000 is an excellent UNIX workhorse for software development work, and scientific and technical processing.

### WYSEpc

from £1925.00

- MS-DOS 2.11
- 256 Kbyte RAM
- Parallel printer interface
- 2 360 Kbyte floppy
- runs Lotus 1-2-3 etc
- GW Basic
- 2 RS232 serial ports
- 14" colour or mono screen
- or 1 floppy & 10 Mbyte HD
- IBM expansion slots

The WYSE pc is an elegant and powerful, but economical microcomputer with IBM compatibility and improved ergonomics.

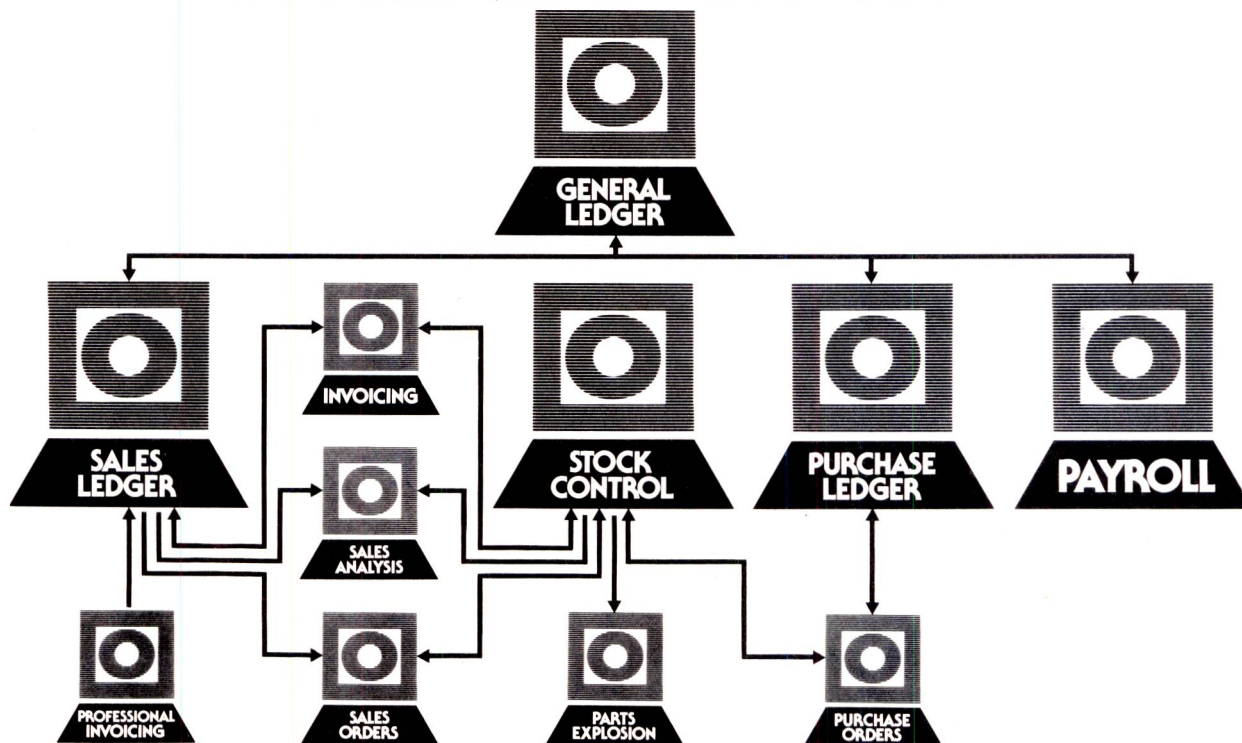
Systematika Ltd. offers a full installation service with a wide range of terminals, printers and applications software.

## Systematika Ltd.

6-7 West Smithfield, London EC1A 9JX. Tel: 01-248 0962



# POSITIVE SOFTWARE SYSTEMS OVERVIEW



## PRICES:

✓ Single User

✓ Multi-User

Sales Ledger .....	£285	£485
Purchase Ledger .....	£285	£485
Stock Control .....	£285	£485
General/Nominal Ledger .....	£285	£485
Payroll .....	£285	£485
Invoicing .....	£285	£485
Professional Invoicing .....	£285	£485
Monthly Invoicing .....	£285	£485
Sales Order Processing .....	£185	£285
Purchase Order Processing .....	£185	£285
Parts Explosion .....	£185	£285
Sales Analysis .....	£185	£285
Incomplete Records .....	£285	£485

Portfolio Management ..... Price on application

All prices exclude VALUE ADDED TAX

✓ CPM/80, CPM/86, PC-DOS, MS-DOS

✓ CONCURRENT CPM/86, XENIX

## FOR FURTHER INFORMATION

PLEASE COMPLETE AND RETURN TO:  
POSITIVE SOFTWARE LTD  
ALMELEY  
HEREFORD HR3 6RD  
OR TELEPHONE (05446) 777



**THINK  
POSITIVE**

NAME \_\_\_\_\_  
POSITION \_\_\_\_\_  
COMPANY \_\_\_\_\_  
TELEPHONE No \_\_\_\_\_



## SHARP POCKET COMPUTERS

**PC1401**  
Pocket computer with BASIC command keys, 59 pre-programmed scientific functions, 40K ROM, 4.2K RAM, memory safeguard, 15 levels of parentheses and 8 levels of pending operations. CE-126p optional thermal printer/cassette interface. CE152 cassette recorder.  
**£79.95**

**PC1260 NEW**  
Pocket computer with 2 line 24 digit display and built-in help function and easy simulation program. 40K ROM, 4.4K RAM. 18 reservable keys, password and beep functions. CE125 micro cassette/thermal printer interface. Or: CE126p thermal printer/cassette interface. CE152 cassette recorder.  
**£99.95**

**PC1251**  
Pocket computer with extended BASIC 8-bit CPU, 24K ROM and 4.2K RAM with 18 reservable keys for fast programming. Memory safeguard. CE125 optional micro cassette/printer interface.  
**£79.95**

**PC1350 NEW**  
Pocket computer with 150 by 32 dot full graphic display which accommodates 4 lines of 24 characters. Extended BASIC 40K ROM and 5K RAM. Optional CE 201M 8K and CE202M 16K RAM cards which slip easily into the back of the 1350. CE126p thermal printer/cassette interface. CE152 cassette recorder.  
**£129.00**

**PC1500A**  
Pocket computer with 8 bit CPU, 16K ROM, 8.5K RAM, 6 reservable keys, program lock function. Optional extras include 4 colour plotter printer with cassette interface, cassette recorder, software board, RS232C and parallel interface. 4.8 and 16K expansion RAM modules are also available. Memory safeguard.  
**£189.00**

# WITH OUR SHARP POCKET COMPUTERS THERE'S FREE SOFTWARE FOR YOU TO POCKET TOO!

Purchase any one of these great Sharp pocket computers and you'll receive a voucher worth £10 off the cost of any Sharp pocket computer software.

Here are just some of the software titles you can choose from, available at two leading software specialists—'Elkan Electronics' in Manchester, and 'Micros for Managers' in London.

Easi-Calc—£14.95 (PC1251, PC1260, PC1350) £19.95 (PC1500A). Easi-File—£14.95 (PC1251, PC1260, PC1350)/£19.95 (PC1500A). Personal Directory—£10.00 (PC1251) Personal Budget—£10.00 (PC1251) Easi-Cash, Easi-Thought, Easi-Note, Easi-Trend—£19.95 (PC1500A) each. Easi-One (6 programs in one)—£24.95 (PC1500A) Advanced Mathematics Package—£24.95 (PC1401, PC1350, PC1500A) Utilities: Bank Account/Car Costs/Dates Calendar/Telephone Timer £14.95 (PC1251)

And there are many more. All you have to do is send for our software brochures for more details.

If you're a software author, we'd like to hear about your programs with a view to including them in our selection.

### Personal Computer Peripherals

CE125 cassette/printer interface—£99.95 (used with PC1251, PC1260) CE126p cassette/printer interface—£59.95 (used with PC1251, PC1260, PC1401, PC1350) CE150 printer—£149.95 (used with PC1500A) CE161 16K RAM module—£110.00 (used with PC1500A) CE152 Data recorder—£39.95 (All models) CE159 8K RAM module—£89.95 (used with PC1500A) CE151 4K RAM module—£49.95 (used with PC1500A) CE201M 8K RAM Card—£69.95 (used with PC1350) CE202M 16K RAM Card—£114.95 (used with PC1350)

### How to order

Simply use the order form below and either enclose a cheque/PO or include your Access/Visa number. Then send the order form to your nearest software specialist. Please allow 28 days for delivery. Offer ends 31.8.85

## ORDER FORM

Please send me the items I have indicated below.  
(All prices include VAT and Post/Packaging).

QTY	ITEM	PRICE	TOTAL
	PC1251 Pocket computer	£ 79.95	
	PC1401 Pocket computer	£ 79.95	
	PC1350 Pocket computer	£129.00	
	PC1260 Pocket computer	£ 99.95	
	PC1500A Pocket computer	£189.00	
	CE125 Printer/cassette interface	£ 99.95	
	CE126P Printer/cassette interface	£ 59.95	
	CE150 Printer	£149.95	
	CE152 Data Recorder	£ 39.95	
	CE161 16K RAM Module	£110.00	
	CE159 8K RAM for PC 1500A	£ 89.95	
	CE151 4K RAM for PC 1500A	£ 49.95	
	CE201M 8K RAM Card for PC1350	£ 69.95	
	CE202M 16K RAM Card for PC1350	£114.95	
	Easi-Calc Software	£ 14.95	
	Easi-Calc Software (PC1500A)	£ 19.95	
	Easi-File Software	£ 14.95	
	Easi-File Software (PC1500A)	£ 19.95	
	Personal Directory Software	£ 10.00	
	Personal Budget Software	£ 10.00	
	Easi-One Software (PC1500A) Only	£ 24.95	
	Advanced Maths Package	£ 24.95	
	Utilities Software	£ 14.95	
	Easi-Cash Software	£ 19.95	
	Easi-Trend Software	£ 19.95	
	Easi-Thought Software (PC1500A)	£ 19.95	
	Easi-Note (PC1500A)	£ 19.95	
	Easi-Cap (PC1500A)	£ 13.95	
		<b>TOTAL £</b>	

Please deduct £10.00 from total, only if ordering software with a personal computer.

I enclose a cheque/PO for £

Please make cheques/PO payable to either  
**ELKAN ELECTRONICS or MICROS FOR MANAGERS**

Please charge my Access\*/Visa no.

\*Please delete whichever does not apply. ☐

Please send me more details on Sharp Software  
(Tick if required) ☐

NAME MR/MRS/MISS\*

ADDRESS

POSTCODE

TEL

Send to:

ELKAN ELECTRONICS,  
11 Bury New Road,  
Prestwich, Manchester. M25 8JZ.  
Tel: 061-798 7613 (24 hrs).

MICROS FOR MANAGERS,  
149 Gloucester Road,  
London. SW7 4TH.  
Tel: 01-370 5125.

**SHARP**  
INTEGRATED BUSINESS SYSTEMS



## ADVERTISERS INDEX

<b>A</b>		Discount Micros	103	<b>M</b>		Rhone Poulenc	56, 57
ACT	120, 121	Disking	87, 88, 89	Map '80 Systems	276	RSD	77
Actel	260	Display Communications	69	Mayfair Micros	64, 280		
Adelphi	147	Display Electronics	172	Medic Datasystems	149	<b>S</b>	
Advanced Input Devices	74			Memorex	100, 101	Sage	161, 168
Advanced Resources	260			Metacomco	97	Samson Bond	6
Akhter	40, 41	<b>E</b>		Microbridge	8	Sanyo Micro Users Association	156
Alphadisc	130	Elite	203	Micro Computer Consultants	25	Sharp Electronics	71
Amstrad	104, 105	Enterprise	112, 113	Microfast	147	Sharpsoft	77
Anchorlord	54	Epson	219	Microgeneral	10	Silica Shop	55
Arcon	272			Microlink	276	Silicon Valley	IFC, 9, 31
Associated Book Publishers	60			Micromedia	279	Softcell	32, 33
AT Computerworld	258, 259	<b>F</b>		Micro Peripherals	IBC	Software Arts	193
ATT	21	Fraser Associates	174	Micro Processor Engineering	51	Southwest Gas	47
Australian Trade Commission	203	Freerose	129	Micro Resources	43	Spectrum	268, 269, 270, 271
Autoram	180	Fuji	127	Micro Rent	278	Star	28, 29
Axis	261, 262, 263, 264, 265	Fujitsu	79	Micro Computer Services	46	St Brides School	77
				Micro Vitec	257	Stirling	108
				Microware	14, 15	Swanley Electronics	58
				Mighty Micro	279	System Science	99
				Mirage	46		
				Miracle Technology	50		
				MLH	31		
				Modem House	102	<b>T</b>	
				Morgan Camera	68, 85	Tags	277
				Morse Computers	116	Tailored Business Systems	48, 107, 109
				Move Mead	62	Tasha	11, 12, 13
				MPI	275	Tasman	52, 53
						Tecmar	154
						Technomatic	36
				<b>N</b>		Telesystems	59
				New Horizons	61	TFH	85
				Newtrends Technology	31	Thoughts and Crosses	43
				North West Computer Supplies	58	Tiger Software	17
						Twillstar	64
						Twindata	156
				<b>O</b>			
				01 Computers	5		
						<b>U</b>	
						U-Micros	224, 260
						United Disc Memories	16, 17
				<b>P</b>			
				Palantir	24		
				Pam Computers	4		
				Parkins Associates	28	<b>V</b>	
				Pathtrace	47	Vic Odden	275
				Personal Computers	OBC	Viglen	78, 231
				Pinner Word Pro	273	Vision Stor	225
				Program Technology	106		
				Puzzle Corner	7		
						<b>W</b>	
						Weirlord	58
						West One Galaxy	38
				<b>Q</b>		Worldwide Computers	272
				Quest	119		
				<b>R</b>		<b>X</b>	
				Regional Systems	99	X-Data	266, 267

# MICROMART ADVERTISERS INDEX

<b>A</b>		<b>H</b>		<b>M</b>		<b>S</b>	
A C Computers	244	Alistair Hamilton	232	Micromods	256	Software Technology	237
ACK Data	234	Harrison Ward Associates	244	Micro Processor Engineering	238	South Yorkshire Promotions Ltd	251
Algol Applications	246	Hiltec Electronics	235	Microstar	232	Spectronics	251
A Line Dataspeed Devices Ltd	233			Microsave Systems	246	Sumlock Electronics	249
Altek Instruments	240			Mid-Surrey Media	244	Supersoft	234, 242
AMA	241	<b>I</b>		Monas	239	Synchronicity	253
A N Electronic & Computer Services	247	IDS Computer Supplies	246	Morgan Camera Company	256		
Anita Electronic Services (London) Ltd	240			MSS Dundee	247	<b>T</b>	
Are Electronics	248					Trisoft	235, 237
Auragold Computing	245	<b>K</b>		<b>N</b>			
		Kambal Data Systems	253	Nationwide Colour	256	<b>V</b>	
<b>B</b>		KECM	252			Valemill	245
Barley Mow Workspace	243	KGJ Insurance Brokers	252	<b>O</b>		Video Action Services	249
Bolton Wells	255	KK Stationers	236	Offshore Software	236		
Budget Typesetting	254	Kingsley Enterprises	248			<b>W</b>	
		Mr L C Kirkwood	242	<b>P</b>		W D Software	238
				Personal Computer Services	238	William Stuart Systems	256
<b>C</b>		<b>L</b>		Peterson Electronics	237	Wordsmiths	241
Cairn Associates	243	Leicester Computer Systems Ltd	245	Photographic & Optical Services	250		
Conway Computer Services	254	Logifix	252	Pride Utilities	255		
C-Ram	236	Level Ltd	254	Professional Magnetics	240	<b>EDUCATION</b>	<b>256</b>
						Microcomputer Advisory Centre	
<b>E</b>		<b>M</b>		<b>S</b>		J P Magnetics	
Eidersoft	234	Martelec Ltd	247	Saltigrade	249	GCE Tutoring	
Elswick Video Electronics Ltd	242	Microcosm Computing	248	Simple Solutions	239	Computer Books	
Estone Electrical	251	Microfactor					



## PASCAL COMPILERS

The new version 3.0 of TURBO Pascal is here. Some Microsoft & DR products are at bargain prices. We also have a selection of Pascal Libraries and Toolboxes not shown here.

<b>8-bit</b>	Nevada Pascal (JRT4)	£ 40
	Turbo Pascal v3.0	£ 55
	DR Pascal/MT+	£ 99
	Pro Pascal	£199
<b>16-bit</b>	Utah Pascal (JRT)	£ 40
	Turbo Pascal v3.0	£ 55
	Microsoft Pascal	£ 95
	SBB Personal	£160
	SBB Professional	£395
	Practical Pascal	£145
	Pro Pascal	£290
	DR Pascal/MT+86	£295

For information or advice call us.

## MODULA-2 & ADA

New products this month are the Zurich native code compiler for Z80, the Interface Technologies Compiler, a delightful product for the IBM PC, and the 'affordable' JANUS C-Pack.

### MODULA-2 COMPILERS

Modula Corp (MS-DOS, Apple)	£ 95
Zurich Compiler (Z80 CPM)	£160
Volition (various)	from £265
Logitech (MS-DOS, CP/M-86)	£380
Interface Technologies (PC-DOS)	£225

### ADA (subset) COMPILERS

Augusta (CP/M-80)	£ 80
Supersoft (CP/M-80)	£180
Janus D-Pack (CP/M-86, MS-DOS)	£895
Janus C-Pack (CP/M-86, MS-DOS)	£150
Janus (CP/M-80)	£125

For information or advice call us.

## THE BASIC LANGUAGE

In addition to an exceptional range of structured basics we have bargains among the Microsoft BASIC's.

<b>8-bit</b>	CBASIC	£125
	CBASIC Compiler	£385
	MBASIC Interpreter	£ 80
	MBASIC Compiler (BASCOM)	£375
	BBC BASIC Interpreter	£ 95
	S-BASIC Compiler	£185
	ALCOR multi-BASIC	£135

<b>16-bit</b>	GW-BASIC 1.0 Interpreter	£ 80
	GW-BASIC 2.0 Interpreter	£ 95
	GW-BASIC Compiler	£125
	MS-BASIC Interpreter	£330
	MS-BASIC Compiler	£135
	MS Bus. Basic Compiler	£440
	CBASIC	£250
	CBASIC Compiler	£450
	Applications BASIC	£395
	Better BASIC	£195
	MEGABASIC	£375
	Professional BASIC	£ 99
	ALCOR Multi-BASIC	£135

For advice or information call us.

## HIGH-LEVEL LANGUAGES

The products listed here are a very diverse grouping. If you suspect that you need more than a conventional 'procedural' language to solve your problem then we can advise which of these languages might suit you.

### PROLOG

<b>8-bit</b>	micro-PROLOG	£ 75
	PROLOG-1	£225

<b>16-bit</b>	PROLOG-86	£135
	micro-PROLOG v3.1	£150
	micro-PROLOG v4.0	£265
	PROLOG-1	£299

### LISP

<b>8-bit</b>	Toolworks LISP/80	£ 45
	iLisp	£ 80
	Waltz Lisp	£170
	muLisp-80	£190

<b>16-bit</b>	Toolworks LISP/86	£ 45
	BYSO LISP	£ 95
	IQ Lisp	£195
	muLisp-86	£240
	Gold Common Lisp	£550

### NIAL, SNOBOL, muMATH

muMath/muSimp	from £240
Q'Nial (IBM PC)	£350
SNOBOL+	£ 85

### EXPERT SYSTEM SHELLS

Micro Expert	£500
APES	£180
ES/P ADVISOR	£595

### SMALLTALK

Methods (PC-DOS)	£265
------------------	------

For advice or information call us.

## FORTRAN COMPILERS

We are introducing here the Lahey and RM professional quality Fortran 77 compilers. Our Microsoft 16-bit compiler is a bargain. We also stock several Fortran Libraries

<b>8-bit</b>	Nevada Fortran	£ 35
	Pro-Fortran	£199
	Microsoft Fortran	£475

<b>16-bit</b>	Microsoft Fortran	£ 95
	DR Fortran 77	£270
	Pro-Fortran	£290
	Lahey Fortran F77L	£495
	RM/FORTTRAN 77	£495

For advice or information call us.

## PRICES & DELIVERY

Prices do not include VAT or other local taxes but do include delivery in UK & Europe. Please check prices at time of order, ads are prepared some weeks before publication.

Many other products are stocked for which there is no space here.

We welcome payment by credit cards including telephone orders.

## THE C LANGUAGE

New versions from Aztec, Wizard, Toolworks and Microsoft, the new C-TERP, several new libraries, and lower prices for Lattice & Aztec.

### C COMPILERS

<b>8-bit</b>	Aztec C II v1.06D	£160
	Aztec C65 v1.05C	£160
	BDS C v1.50a	£110
	Toolworks C/80 v3.1	£ 45
	Eco-C v3.1	£190

<b>16-bit</b>	Aztec C86/BAS v1.06D	£160
	Aztec C86/PRO v3.2	£350
	CI Optimizing C86 v2.2	£295
	C-Systems C v2.0	£210
	De Smet C88 v2.4	£145
	Digital Research C v1.1	£270
	Lattice C v2.14	£350
	Mark Williams MWC86 2.0	£425
	Microsoft C v3.0	CALL
	Toolworks C/86 v3.1	£ 45
	Wizard C v2.1	£395

### C INTERPRETERS

Instant-C v1.01	£395
RUN/C v1.1	£130
C-terp	£295
Introducing C	£125

### C LIBRARIES

<b>Data base</b>	C-tree (source)	£325
	Multikey	£170
	db-VISTA (source)	£395
	V-FILE	£295
	Btrieve	£245
	C-to-dBase (source)	£150
	Phact	£250
	SoftFocus Btree (source)	£ 90
	dBc (dBASE III)	£195

<b>Graphics</b>	Multi-HALO	£195
	C Tools (source)	£110

<b>Screen</b>	Panel	£245
	Lattice Windows	£235
	Windows for C	£195
	Curses	£110

<b>Misc</b>	Greenleaf Functions, sce	£175
	C Food Smorgasbord	£150
	Plink-86	£325
	Pfix Plus	£325
	C Helper, source	£135
	C Refiner	£145
	Basic C	£175
	Bastoc	£325

More libraries not listed here.

## DISK COPYING SERVICE

Moving data and program files from one machine to another is often made difficult because different manufacturers have adopted different disk format standards.

We can copy your files to and from over 400 disk formats including CP/M, CP/M-86, MS-DOS, PC-DOS, ISIS, APPLE, SIRIUS, TORCH, APRICOT, HP150, TRSDOS, DEC RT-11, and IBM BPF.

Disks are normally despatched on the day they are received.

Our charge is £10.00 + disk + VAT. Special prices for quantities.

For more information call us.





# CHIP CHAT



*The assorted PCW contributors and staff who appeared in the 4 Computer Buffs TV series have found some kind of fame in another magazine, The Listener. The review of the show begins: 'It will be recalled that Channel 4 was set up to cater for the needs of black, one-legged, Welsh-speaking homosexuals and other persecuted minorities. It was therefore predictable that Mr Isaacs and his colleagues would one day turn their attentions to the growing band of computer enthusiasts.' And it continues: 'Various spotty and bearded hackers were actually shown on camera.' In passing, Sinclair obviously agrees about the spots — the QL is being promoted alongside a medicine which promises to cure acne.*

*Those sporting the beards on TV included Guy Kewney and David Tebbutt. In case you don't recognise them, Guy is the grim-looking gentleman who looks as though he's leading a Nordic invasion, while David appears very pleased to be holding a board in each hand. And if you think these photographs are less than flattering, you should have seen the ones of our editor — but he's shredded those, negatives and all.*

*We're inviting readers to submit captions for either or both of the photographs. People in the industry eager to extract revenge for the ignominy ChipChat puts them through each month should note that only suggestions fit for publication will be considered. Entries, on the back of a postcard please, to ChipChat, PCW, 62 Oxford St, London W1A 2HG.*

*Include your name and address as well in case you win the £10 prize, which goes to M de Roussier of Gerrards Cross for his March entry. That picture, you will of course recall, featured two Winalot dogs staring despondently at a micro. The winning suggestion was: 'Take a good look at the opposition, son — if they ever manage to house-train these beasts, we'll be out of business.' As this entry coincided with the day most of our micros decided to behave other than we wanted them to, some more house-training seems like a good idea. Perhaps we need a Barbara Woodhouse.*

**On the ball:** proving that every cloud has a silver lining for a computer company, Sperry and Systemsolve are promoting a computer-based identity card service to 'beat the menace of hooligans at football matches' and 'restore the fortunes of soccer in Britain'. Step up the robot design, lads, and you might be able to give England a chance in the next World Cup.

**Bridge of Sighs:** one joke doing the rounds at the moment concerns the name of the next Acorn machine, now that the Olivetti connection has been established. Acornetto is the suggested title, although Cambridge's Silicon Fen isn't as attractive as Venice.

**Star turns:** following the Commodore 64 game Jack Attack (in loving memory of founding father and now Atari renegade Jack Tramiel) comes Super Pipeline II, featuring Sir Clive in a C5 at the end of the first level. Scorpio Gamesworld is reported to have enlarged on the same theme with its C5 Clive but this time keeping it in the family — the game runs on the Spectrum.

**Punting:** back in Silicon Fen, and still on Sir Clive, we hear the great man once invested in the TV show *Spitting Image*. Perhaps he should have invested more if he wanted to escape being lampooned, though doubtless he's not bothered by his puppet or its antics.

We also hear that Sir Clive is an avid reader of ChipChat — we're waiting for him to enter the caption competition before we believe this. And if you could spare the time, Sir, we'd also like to know if the American Timex machines are coming to the Continent. Could it be that Portuguese holidaymakers are in for a Sinclair surprise?

**A-maze-ing:** long before mice began to breed on desk-tops, home-brewed versions made their way around mazes. The next UK micromouse finals take place on the last day of the European Personal Robot Congress, which runs from 2-4 July at the London West Hotel. Having watched mice career around fairly simple mazes, it'll be interesting to see how they cope with the Japanese maze being flown in especially for the event. It's not clear whether ritual suicides will be in order for any mice which fail to rise to the challenge, but it will give competitors a chance to tune

up for the August World Finals to be held in Japan with the assistance of the Japanese Science Foundation — showing that this is serious business as well as fun.

**Ultimate goes to Hollywood:** back-patting, fixed grins, and phrases such as: 'Didn't they do well?' were once again the order of the day at this year's Golden Joystick Awards. The ceremony produced few surprises, with Ultimate being voted Software House of the Year and Knight Lore the best game. However, as is customary at these functions, not everyone was happy with the results. While it was all smiles and laughter above-board, downstairs in the gentleman's toilet the losers displayed a bitchiness more appropriate to Hollywood than home software.

Oh well, at least we can be grateful that the winners resisted thanking everyone from their great-grandmother to the inventor of the silicon chip for their success.

**Am I blue?:** little-known music maker IBM, or 'Big Blue' as it's sometimes referred to in its more famous role of computer manufacturer, launched an expensive publicity campaign on the unsuspecting French earlier this year. Musical microchips were used in advertisements published in a French paper — open the page and the chip began to sing the praises of the PC. Reports that sales of ear plugs rose on the same day have not so far been confirmed.

**We jest not:** this year Wang promoted its office automation products at a show featuring 'Nell Gwynnes offering their wares, court jesters, bunting, banners and balloons'.

They're more sophisticated than that across the Atlantic. The autumn conference of the Office Automation Society is a 'total immersion workshop' being held 'in lecture rooms and cabana rooms surrounding the indoor pool and jacuzzi'. Meet you by the pool, Nell.

**Following yonder star:** not that it's likely, of course, but we've some good news just in case you should want to find out if you have any family connections with Ronald Reagan or his Irish ancestral home of Ballyporeen. The local priest has produced a database of the relevant records — dBasell is the package used and a Northstar Advantage the machine. **END**



# Affordable and reliable printers from **Micro P** give you more *Quality* CPS for your money



CPA 80 - 100 cps  
+ EPSON COMPATIBLE

CPB 80 - 130 cps  
+ IBM COMPATIBLE

FROM **£199\***



MP 165 - 165 cps  
+ EPSON COMPATIBLE  
NLQ PRINTER

FOR ABOUT **£269\***



CPP 40 - 4 COLOUR  
PORTABLE  
PRINTER/PLOTTER

FOR ABOUT **£79\***



Even in today's high tech world, for most of us, the written word is still the least expensive means of sending and receiving information. If you own a microcomputer the chances are that sooner or later you are probably going to need a printer in order to get into print.

## **Micro P** — CPP40

A low cost 4 colour 40/80 column printer/plotter capable of printing text or graphics on plain paper. The CPP40 is an ideal companion for small and portable micro's, as it is fitted with re-chargeable batteries — perfect for beginners.

## **Micro P** — CPA80

With 100 cps quality printing, the CPA80 probably gives more cps/£ than any other printer available today. The CPA80 is packed with features you would normally find on a more expensive printer. With an optional RS232 version available (even for the QL) this Epson compatible printer will hook up to almost any micro.

Buy from your local dealer today!

## **Micro P** — MP165

Looking for a matrix printer as well as a daisywheel? Well, the MP165 combines all the attributes of these two technologies to give a matrix printer capable of printing at up to 165 cps, as well as providing crisp Near Letter Quality, (NLQ) print at 75 cps. Features include a 2k buffer as well as both friction and tractor feed, as standard. Ideally suited to most popular micro's, the MP165 is now available in a new RS232 QL compatible version.



"PRINTERS FOR ALL APPLICATIONS"

INTEC UNIT 3, HASSOCKS WOOD, WADE ROAD,  
BASINGSTOKE, HANTS. ENGLAND, RG24 0NE.

Telephone: BASINGSTOKE (0256) 473232 (32 lines).

Telex: 859669 MICROP G Facsimile: 0256 461570

\* Full 12 months warranty - RRP ex. VAT. QL is a registered Trade Mark of Sinclair Research.



# Macintosh<sup>TM</sup> and all that Jazz!

At our Macintosh Centre, you'll be surprised how quickly you can play solo on Apple's Macintosh — even if it's the first computer you've ever laid hands on.

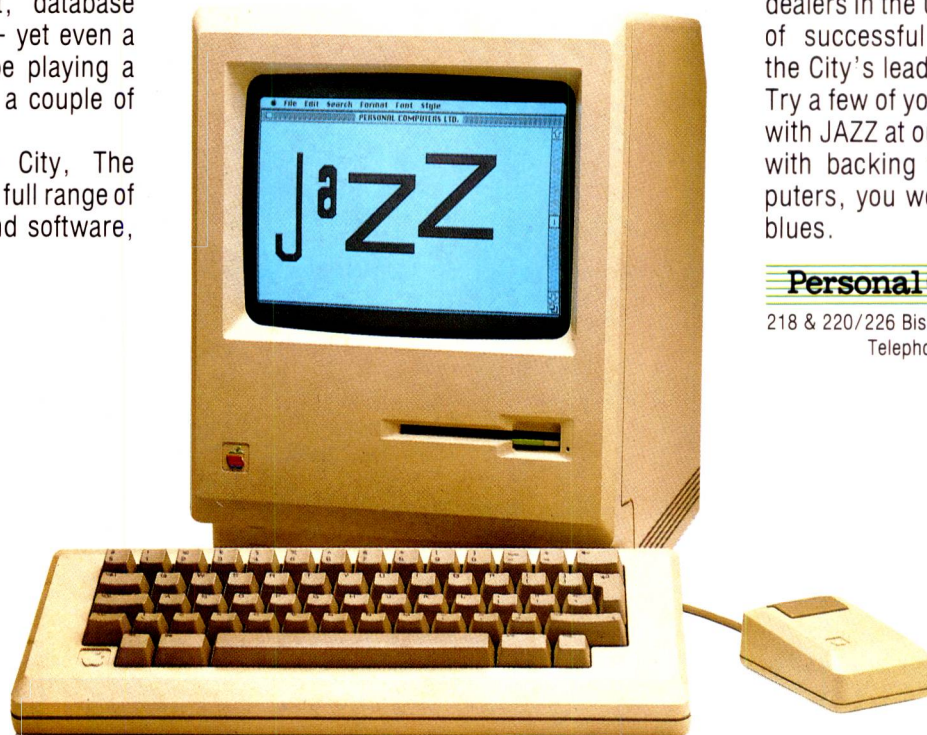
Now you can try JAZZ too — the brilliant new business software from Lotus that's designed **specially** for the Macintosh, and makes full use of all its easy-to-use features. JAZZ lines up five business essentials: word processing, graphics, spreadsheet, database and communications — yet even a complete novice can be playing a wide repertoire in just a couple of hours.

In the heart of the City, The Macintosh Centre has a full range of business computers and software,

plus our professionals on hand for advice. Whether your business is trad or modern, you'll applaud the total support services you get from the Personal Computers Macintosh Centre . . . consultancy . . . expert training . . . qualified engineering . . . plus an in-depth understanding of the business software you need.

As one of the largest and longest established microcomputer dealers in the UK, we have a history of successful performances with the City's leading firms.

Try a few of your favourite numbers with JAZZ at our Macintosh Centre: with backing from Personal Computers, you won't have to sing the blues.



**Personal Computers Ltd.**

218 & 220/226 Bishopsgate, London EC2M 4JS  
Telephone 01-377 1200

## The Macintosh Centre

218 Bishopsgate, London EC2M 4JS. Telephone 01-377 2060